CHAPTER 3

Survey of Literature on the Efficient Market Hypothesis

A large amount of published research in leading refereed academic journals examined the relation between historical information, financial statement information, publically available information and capital markets, which is referred as capital markets research. This voluminous published research in developed and emerging economy is an indication of the demand for capital markets research. In financial literature, market efficiency tests fall into categories such as event studies, cross-sectional tests of return predictability and application of econometric models. This chapter discusses and review the studies related to capital markets research. This chapter is divided into three sub-sections. In the first part, we discuss the relevant literature on the RWH. In the second part we discuss the literature on semi-strong form of market efficiency. The related review of literature on strong-form of market efficiency is discussed in third part.

Part A

3.1 Empirical Evidences of Random Walk Hypothesis (RWH)

The first category of studies includes mainly the empirical evidences which support RWH. The second category describes the evidences against the theory. Finally literature which gave a mixed opinion is discussed in the third category.

3.1.1 Empirical Evidences which Supported RWH


Working (1934) investigated the random character of stock price pattern. He pointed out that stock prices reflected cumulative process of random changes. This paper showed how to generate random series of numbers for comparative purposes and he defined it as random difference series. By using this random difference series he proposed the process to investigate the extent to which the technical pattern appeared in the observed series. If they appeared with similar frequency as in the real time series, they had no ability to forecast stock prices because changes in the random difference series were not predictable. He found that random series had patterns similar to the ones of technical analysts. Kendall and Hill (1953) examined 22 UK stocks and commodity price series to see any systematic pattern or trend in the stock prices. They concluded that "in series of prices which are observed at fairly close intervals the random changes from one term to the next are so large as to swamp any systematic effect which may be present. The data behave almost like wandering series." The near-zero serial correlation of price changes was an observation that appeared inconsistent with the views of economists. These empirical observations came to be labelled as "random walk model" or even the "random walk theory". Roberts (1959) concentrated on the methodological problems of financial analysts regarding stock price behavior.
and economic time series. He described the chance model which insists on independence but makes no commitment about the relative frequencies or probabilities of different outcomes except that series must be stable over time. He used US stock prices to examine the predictability pattern in the stock prices. He found that US price series follow random walk. Working (1960) examined the effect of averaging successive groups of items in a random chain which is a simplest term of stochastic series to which and certain commodity prices have a close resemblance. He found that serial coefficients of higher order than the first remain zero for the first difference of average of successive groups of items in a random chain. Fama (1965) discussed the theory underlying the random-walk model and then to test the model's empirical validity. It was found that the empirical evidence support of the random-walk model. Van and Parker (1967) tested empirically the random-walk theory relative to certain decision rules based upon past stock-price movements. A sample of thirty stocks on the New York Stock Exchange was selected. Daily closing prices of these stocks were collected from January, 1960 to June, 1966. A rigorous test of past price movements was undertaken, and the evidence was found to support the notion that stock-price changes about the "intrinsic" value of a stock essentially are random. Simmons (1971) reviewed the current status of the random-walk model as it applies to price-change sequences in common stocks, and examined certain striking dependencies in these sequences at the transaction level. He found that the successive transaction-price changes are seen to be negatively correlated, with each price change projecting its negative influence forward toward its successors in the sequence. It was found that the sequences of transaction-price changes and transaction volumes appeared to be essentially unrelated to each other. The non-
random effect discovered in the data was a tendency for high-volume transactions
to occur on down-ticks and to be followed by up-ticks. Hong (1978) examined the
predictability of price trends on stock exchanges of four eastern countries. The
serial correlation test, Runs test and conventional Theil-Leenders test are used in
the study. The results show that among four eastern countries, Japan clearly
exhibits highest market efficiency in both sets of tests. Since the Japanese market
is larger than the other three combined, this suggests that the larger markets are
more efficient. The markets in Australia, Hongkong and Singapore are about the
same size, and therefore not found consistent efficiency orderings among them.
The serial correlation and Runs tests show more serial dependence in Australia
than in Hongkong or Singapore. On the other hand, information theory test
suggests that proportions of advancing or declining stocks were less predictable in
Australia. Cornell and Dietrich (1978) explored whether the exchange markets
have been efficient under the floating rate regime beginning in March 1973. They
applied autocorrelation function and moving average rules for the analysis. The
results indicate that the market for foreign exchange is efficient, at least in the
weak form. In fact, the market for foreign exchange behaves surprisingly like the
market for common stock, despite the dominance of large transactions in exchange
markets: international banks, multinational corporations and governments. The
distribution of daily rates of return on spot currency contracts appears to be similar
to those observed for common stock and commodity futures contracts. Hudson et
al. (1996) used financial times industrial ordinary index, which is the longest daily
series available in the UK, from July, 1935 to January, 1994 to examine weak form
of market efficiency. The index is calculated on the stock prices of 30 UK
companies which cover a wide range of British manufacturing and service
industries. Two of the simplest and most popular classes of technical trading rules i.e., moving average rules and trading-range breakout rules are examined in this study. They found that it is not possible to gain excess returns from the examined technical trading rules in the face of expensive trading. The result strongly supports the weak form efficiency of financial markets in UK.

Chang et al. (1996) examined the efficiency of the Taiwan stock market by applying Ljung-Box Q test, the binomial distribution test, the Runs test and the unit root test. The monthly stock index prices are used as data for analysis. The empirical evidence suggests that the monthly stock price for the Taiwan stock market exhibits weak-form efficiency. Seiler and Rom (1997) examined the degree of random walk in daily stock prices for all stocks listed on the NYSE from February, 1885 through July 1962. The Box-Jenkins methodology was employed to identify patterns which could be used to predict stock returns. Modern day anomalies are examined in conjunction with historical data in an attempt to explain the return series. The results are consistent with the preponderance of modern efficient market studies in that historical stock returns are found to follow a random walk. Wu and Chen (1998) examined market efficiency of foreign exchange market. They used Dickey and Fuller test for detecting the unit root component in the observed price series. The daily observations Eurocurrency rates spot exchange rates and forward exchange rates are used as data in the study. The results found that there is unit root component in the observed series, and therefore it supports the hypothesis of foreign exchange market efficiency. Raghbendra and Hari (2000) examined market structure and efficiency of price transmittals in the two national stock exchanges of India i.e. The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The Johansen-Juselius multivariate
cointegration technique was used in the study. It was found that the price movements within each market are cointegrated. The short-run ECM analysis shows that no stock in any market is exogenous, thus indicating that there is considerable feedback in short-run price movements from each stock. Some short-run price movements have been stabilizing. Therefore, it is concluded that BSE and NSE appear to be reasonably efficient markets. Dockery (2001) examined dynamic behaviour of prices in the Athens Stock Exchange. The variance ratio test and test for fractional integration is used to investigate the presence of mean dependence in a full sample of individual shares of the Athens Stock Exchange. Using monthly data, the tests fail to reject the null hypothesis of a random walk for about two thirds of the stocks during the period 1988 - 1994. Most violations are due to mean averting behaviour. Cuthbertsona and Hyde (2002) analysed the market efficiency of French and German stock markets and the excess volatility. They assess efficiency in each market by employing the VAR methodology by adopting two alternative assumptions regarding equilibrium expected returns. The first model assumes that equilibrium expected excess returns are constant, while the second model assumes that equilibrium returns depend upon a time varying risk premium which varies with the conditional expectation of the return variance. From the results they found that the model which assumes constant excess returns is clearly rejected for both France and Germany. However, there is no volatility clustering in the observed series, and therefore, market is efficient. Buguka and Brorsen (2003) tested the random-walk version of EMH for the Istanbul Stock Exchange (ISE) using its composite, industrial and financial index weekly closing prices. To test the RWH in stock market prices, a 396-week time span from 1992 to 1999 is used. The choice of a weekly observation interval was determined by
following two considerations. They stated that weekly sampling is the ideal compromise, yielding a large number of observations while minimizing the biases inherent in daily price data. The results obtained from three of the tests i.e., ADF test, GPH fractional integration test, LOMAC single variance ratio test indicated that all three series are random walk series. Franch and Opong (2005) examined the behavior of the return series of the Euro-based exchange rates by applying the traditional variance ratio test. The data for the study consists of daily nominal exchange rates for the Australian dollar, Canadian dollar, New Zealand dollar, Japanese yen, British pound, Norwegian kroner, Singapore dollar, Swedish krona, Swiss franc and United States dollar, all relative to the Euro from 5 January, 1999 to 11 November, 2002. Overall results show that evidence was consistent with random walk behavior of Euro exchange rates. Comparison of the results of the study produced from various tests demonstrated that there is potential for considerable variation when examining the weak form efficiency of exchange rates series across countries. While the results suggest that the behavior of Euro exchange rates for the major trading currencies is weak form efficient. Gupta and Singh (2006) investigated weak form of efficiency in Indian equity futures market. For this purpose, informational efficiency of the Nifty futures and 24 stock futures is examined. The Nifty and stock futures returns are found to be deviating from normal distribution. Futures prices are found to be non-stationary at levels whereas, first difference futures returns are stationary. Narayan and Narayan (2007) investigated evidence for mean reversion in stock prices. The study used five different panel unit root tests, namely, the Im, Pesaran and Shin t-bar test statistics, the Levin and Lin test, the Im, Lee, and Tieslau Lagrangian multiplier test statistic, the seemingly unrelated regression test, and the multivariate
augmented Dickey Fuller test advocated by Taylor and Sarno. The main finding was that there is no mean reversion of stock prices, consistent with EMH. The role of structural breaks was not considered by this study. It may be that EMH is contingent on structural breaks in stock prices. Future studies can concentrate on structural breaks to get accurate results. The findings have implications for econometric modelling, in particular forecasting. Narayan and Smyth (2007) provide evidence on the RWH in G7 stock price indices using unit root tests which allow for one and two structural breaks in the trend. The natural logs of monthly stock prices were collected from G7 countries which are obtained from the OECD Main Economic Indicators. The time span varies between countries depending on data availability. Overall, the results support the RWH. They also considered the implications of the identified structural breaks for movement in stock prices over time. Asiri (2008) measured the behaviour of stock prices in the Bahrain Stock Exchange (BSE), which is expected to follow a random walk. The Dickey-Fuller test was used as a basic stochastic test for a non-stationarity of the daily prices for all the listed companies in the BSE. In addition, autoregressive integrated moving average (ARIMA) and exponential smoothing methods are also used. Cross-sectional-time-series was used for the 40 listed companies over the period 1 June 1990 up until 31 December 2000. The results show that the random walk with no drift and trend is confirmed for all daily stock prices and each individual sector. Other tests, such as ARIMA (AR1), autocorrelation tests and exponential smoothing tests also supported the efficiency of the BSE in the weak-form. The finding of the study is a necessary piece of information for all investors whether in Bahrain or dealing with Bahrain stock market. Raja et al. (2009) empirically examined the informational efficiency of Indian stock market with regards to stock
split announcement released by the information technology companies. The results show that the security prices are reacted to the announcement of stock splits. The reaction took place for a very few days surrounding day 0, remaining days it was extended up to +15. Thus one can conclude from the forgoing discussion that the Indian stock markets in respect of IT companies are efficient. Serletis and Rosenberg (2009) revisited the evidence for the weak form of the EMH. They used daily data, over the period from 5th February 1971 to 1st December 2006 of four US stock market indexes – the Dow Jones Industrial Average, the Standard and Poor’s 500 Index, the NASDAQ Composite Index, and the NYSE Composite Index. The ‘de-trending moving average (DMA)’ technique was used for the analysis. It was concluded that US stock market returns display anti-persistence. They concluded that the stock market in the United States is consistent with the EMH. Sharma and Mahendru (2009) investigated the validity of the EMH on the Indian Securities Market. Taking a sample of eleven securities listed on the Bombay Stock Exchange (BSE), they applied the Runs tests and the autocorrelation tests in order to judge the efficiency of the stock markets. The autocorrelation test was applied to first differenced series. It was found that the effect of stock prices for the sample companies on future prices was very meager and investor cannot reap profits by using the share price data as the current share prices already reflect the effect of past share prices. Chigozie (2010) investigated whether the Nigerian stock market follows random walk. The GARCH model is applied for the analysis. The result shows that the Nigerian stock market follows random walk, and therefore, no investor can outperform the market make abnormal profits. Chiang et al. (2010) used the traditional variance ratio test, the non-parametric-based variance ratio test and the multiple-variance ratio test to examine the validity of the weak form EMH
for foreign exchange markets in four floating-rate markets in Asian economies. The daily closing prices of foreign exchange rate of Japan, South Korea, Taiwan and the Philippines were obtained from the AREMOS database. The sample period for this study covered from 1 January, 1998 to 23 August 2006. The results show that random walk patterns of the exchange rate return series cannot be rejected, with the one exception of Taiwan. Therefore, it was concluded that the foreign exchange markets of Japan, South Korea and the Philippines are weak form efficient. Alexeev and Tapon (2011) used model-based bootstrap to generate a series of simulated trials and a modified chart pattern recognition algorithm to all stocks listed on the Toronto Stock Exchange (TSX) to examine the weak form efficiency. The daily closing prices for 1283 TSX securities was collected for the time period August, 1980 to August, 2010, a span of 30 years. The results suggest that TSX is weak form efficient. In addition, pattern frequencies appear to be negatively dependent on the two moments of return distributions, variance and kurtosis. AlKhazali (2011) examined the market efficiency for six emerging stock markets in the Gulf Cooperation Council (GCC) countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. This study used the LOMAC single variance ratio (VR) test and the Wright’s rank and sign VR tests to examine informational efficiency after correcting the data for thin trading that typically characterizes these indexes. The observed indexes in thinly traded markets may not represent the true underlying index value; there is a systematic bias toward rejecting the EMH. The results of this study show that after removing the effect of infrequent trading the RWH was not rejected in all GCC equity markets. Dritsaki (2011) examined the RWH in the Visegrad Countries stock market which is emerging stock markets. The data set consists of stock market
indices for the Visegrad Countries, namely, Poland, Czech Republic, Hungary and Slovakia. These are the WIG for Polish stock market, PX-50 for Czech Republic, BUX for Hungary and SAX-16 for Slovakia. Data are monthly covering the period from April 1997 until February 2010. The results both from autocorrelation analysis and unit root tests imply that monthly stock price indices of the Visegrad Countries follow the random walk process. This means that the stock markets of all the Visegrad Countries are efficient in the weak form. By employing cointegration and causality tests, they investigated the long-run and short-run relationships among these markets of the Visegrad countries. The results of cointegration tests confirm that in none of the stock indices there is a cointegrating vector. This means that there are no long run relationships among stock markets of Visegrad countries.

Chuluun et al. (2011) studied the cross-currency and temporal variations in the random walk behavior in exchange rates. The sample period starts in 1974 after the collapse of the Bretton Woods fixed exchange rate system in March, 1973. Using 29 floating bilateral USD exchange rates, it was found that the higher the investment intensity, the less likely it is to reject random walk and the smaller the deviation from random walk. However, the effect of investment intensity is non-monotonic. Application of threshold models shows that after investment intensity reaches the estimated thresholds, the level of investment intensity has no further effect on the deviation from random walk.

Maniatis (2011) examined whether closing prices of Titan stock can be approximated by a random walk and evaluated the risk associated to this stock. They have considered the daily closing prices of the firm’s common stock for the year 2003. The data covers the period from 2 January, 2003 to 31 December 2003, which defines a time series with 247 daily observations. The paper investigates the
existence of unit roots in the stock and in all stock indices by using ADF test. It then investigates the stock’s risk focusing the interest in the behavior of the time series volatility. The study concluded that the predictability of the stock returns is possible, and the risk associated with the stock can to some extent be statistically rationalised. Asiri and Alzeera (2013) examined the weak-form market efficiency in Saudi Arabia's stock market, Tadawul which is expected to follow a random walk. All share index and sectoral indices for daily closing prices in Tadawul between October 15, 2006 and November 15, 2012 was collected. Unit root Dickey-Fuller test, Pearson Correlation test, Durbin-Watson test and Wald-Wolfowitz runs-test are used as basic stochastic tests for a non stationarity of the daily prices for all the listed companies in the market, both overall and sector-wise. The four tests confirmed the weak-form market efficiency in the Saudi stock market for all share prices and 11 individual sectors. Jain et al.( 2013) studied the weak form of efficiency of Indian capital market during the period of global financial crisis. The study considered daily closing prices of S&P CNX Nifty, BSE, CNX100, S&P CNX 500 from April 1, 2005 to March 31, 2010. The data source was the equity market segment of NSE and BSE. Both parametric and nonparametric tests are applied for the purpose of testing weak-form efficiency. The parametric tests include Augmented Dickey-Fuller (ADF) unit root tests and nonparametric tests include Phillips-Perron (PP) unit root tests and Runs test. The results suggested that the Indian stock market was efficient in its weak form during the period of recession. The study reports that all the stocks in these selected indices are fundamentally strong and their prices are not influenced largely by historical prices and other relevant factors which came from industry and any other information that is publically available. Thus it can be concluded that the Indian
stock market was informationally efficient and no investor can usurp any privileged information to make abnormal profits.

3.1.2 Empirical Evidences against RWH


Levy (1967) suggested that simulation models can be constructed which are both understandable to the market practitioner who has little mathematical background and acceptable to the academician who maintains rigorous standards
of evidence. Second, the vast data processing capabilities of electronic computers are invaluable in developing and evaluating strategies for investment selection and market timing. Third, there are several applications of technical analysis which empirically have been proven to be useful in forecasting market price movements. And fourth, stock prices follow discernible trends and patterns which have predictive significance; and the theory of random walks has been refuted. Evans (1968) examined the RWH, portfolio analysis and the buy-and-hold criterion. For this purpose he used the data of 470 securities listed in the Standard & Poor's Index for the year 1958. Observations on each security were taken at semi-annual intervals for the period January 1, 1958 - July 1, 1967 yielding 20 observations for each security. The results show that irrespective of the degree of randomness or "form" characterizing the empirical distribution of security price changes, employment of the fixed investment proportion maintenance strategy yields returns which are significantly superior to those yielded by a naive buy-and-hold strategy. A further conclusion suggested by the results was that although some degree of non-randomness exists in the distribution of security price changes, it is not of a magnitude that should be considered "meaningful" to the investor dealing with "portfolios" of securities. Kemp and Reid (1971) developed a critique of previous tests of RWH. They used daily prices and relatively short series and also relatively large sample of shares to avoid the danger of observing isolated typical behaviour. They used non-parametric tests to avoid unnecessary assumptions about the underlying distribution of price changes. The results show that share price movements were conspicuously non-random over the period considered. Cheng and Deets (1971) investigated the implications of the independence condition without attempting to specify the particular form of the distribution. Weekly price
relatives for the 30 stocks composing the current Dow Jones Industrials were used as a basis for testing the hypothesis. The period covered was from December 31, 1937 to February 21, 1969, a span of 31 years. There were 1625 weekly observations on the 30 stocks totaling 48,750 weekly price relatives. The results shows that the fact that rebalancing yields a greater return than buy and-hold indicates security prices are not independent. The cumulative effect of persistent negative serial correlation results in systematic and not random fluctuation. One important finding was that return is a function of the rebalancing period. This allows the trader to earn an economic profit through frequent portfolio rebalancing.

Ballie and Tim (1989) examined the common stochastic trend in exchange rates by applying univariate tests. The results show the unit root components in seven currencies and spot exchange rates. Further the seven pairs of series were cointegrated. The results further show that the seven exchange rates are tied together in one long run relationship. The disequilibrium error from this relationship is an important component in next periods change in the exchange rate and can be interpreted as a violation of weak form efficiency. Choudhary (1991) analysed the short-run share price behaviour of Indian stock market. The daily price quotations of 93 actively traded shares for the period January, 1988 to April, 1990 used to examine the serial independence of share price changes. He applied the serial correlation test and the Runs test to daily log price changes. The results show that market does not seem to be efficient even in its weak form. The serial correlation test results further suggest that not more than 25 per cent of price changes in a day may be explained by price changes on the previous day. The investors are, therefore, unlikely to benefit much by studying and utilizing the historical price data. Further, the findings are constrained by limited sample size.
and somewhat shorter length of the overall study period. Poshakwale (1996) provided the empirical evidence on weak form efficiency and the day of the week effect in BSE over a period of 1987-1994. The frequency distribution of the prices in BSE does not follow a normal or uniform distribution which was confirmed by the non-parametric KS Test. The results of Runs test and serial correlation coefficients tests indicate nonrandom nature of the series and therefore, violation of weak form efficiency in the BSE. The results provide evidence of the day of the week effect and that the stock market is weak form inefficient. The day of the week effect observed on the BSE poses interesting buy and hold strategy issues. Choudhry (1997) investigated the long-run relationship between stock indices from six Latin American markets and the United States. The empirical investigation is conducted by using weekly data from January 1989 to December 1993. The unit root tests, cointegration tests, and error-correction models are used for the analysis. Results from the unit root tests provide evidence of a stochastic trend in all indices. Results from the cointegration tests indicate the presence of a long-run relationship between the six Latin American indices. The error-correction results indicate significant causality among the stated indices.

Kawakatsu and Morey (1999) examined whether emerging market equity prices have become more efficient after the financial liberalization. They used unit root test and variance ratio test for the analysis. The results show that the observed series are stationary series. The overall results show that markets were efficient before the liberalization and not after the liberalization. Mitura and Hall (1999) extended the classical test for autocorrelation of returns by combining a multi-factor model with time-varying coefficients and the GARCH-M approach to investigate evolving weak-form market efficiency. They verified the test by
employing Monte Carlo simulations and series from the London and Budapest Stock Exchanges. It was found that Hungarian series shows changing levels of inefficiency. Darrat and Zhong (2000) investigated with new daily data, whether prices in the two Chinese stock exchanges follow a random-walk process. They used two different approaches, the standard variance ratio test and a model-comparison test that compares the ex post forecasts from a NAIVE model with those obtained from several alternative models: ARIMA, GARCH and the Artificial Neural Network (ANN). The results show the model-comparison approach rejecting the RWH in Chinese stock markets. Moreover, the results provide a strong support for the ANN as a potentially useful device for predicting stock prices in emerging markets. Huang and Yang (2000) examined the predictability pattern by using the daily returns for the 10 emerging stock markets, South Korea, Malaysia, the Philippines, Thailand, Taiwan, Turkey, Argentina, Brazil, Chile, and Mexico. The data is collected from 1988 to 1998 with total observations of 3194. The Ljung–Box statistic, the ARCH model and GARCH models are used for the analysis. From the results they found that South Korea, Mexico, and Turkey suffered from greater volatility, Argentina, Chile, Malaysia, and the Philippines experienced diminished volatility, and no definitive pattern can be discerned for the other countries after market liberalization. The result from this study is important because the sample period includes the Asian financial crises. Poshakwale (2002) examined the RWH in the emerging Indian stock market by investigating daily returns calculated from an equally weighted portfolio of 100 stocks and a sample of 38 most actively traded stocks in the BSE. The study found that the daily returns from the Indian market do not conform to a random walk. Daily returns from most individual stocks and the equally weighted portfolio
exhibit a significant non-linear dependence. Further examination reveals that most of the non-linear dependence is in the form of ARCH type conditional heteroskedasticity. The unit root tests confirm that non-linear dependence does not appear to be caused by non-stationarity of underlying economic variables. The daily return volatility is time varying and persistent in nature but as measured by a GARCH-M model, it does not explain expected returns. All the statistical evidence rejects the random walk model of efficient price formation for the Indian market.

Balkiz (2003) investigated the informational efficiency of the Kuala Lumpur Security Exchange (KLSE) in terms of the daily Composite Index for the period of January 1977 to May 2002. He used Autoregressive Conditional Heterocedastic (ARCH) modeling and Generalized Autoregressive Conditional Heterocedastic (GARCH) model. It has been observed that such models capture much temporal behavior like thick tail distribution and volatility clustering of many economic and financial variables. The empirical results confirm that KLSE is predictable and thus is not informationally efficient in the weak form and volatility of return is quite persistent when daily observation of composite index is used. Chaudhuri and Wu (2003) investigated mean reversion processes of seventeen emerging markets. The data was collected from International Finance Corporation Emerging Market Database (IFC-EMDB). The monthly observations from January 1985 to February 1997 of Argentina, Brazil, Chile, Colombia, Greece, India, Jordan, Korea, Malaysia, Mexico, Nigeria, Pakistan, Philippines, Taiwan, Thailand, Venezuela, and Zimbabwe were collected. They found that for fourteen countries, stock prices exhibit structural breaks. Furthermore, for ten countries, the null hypothesis of a random walk is be rejected at the 1% or 5% significance level. Zhang and Cheng (2003) used Gaussian mixture modelling to detect random walks in capital markets.
with the Kolmogorov-Smirnov test. The main idea is to use Gaussian mixture modelling to fit asset return distributions and then use the Kolmogorov-Smirnov test to determine the number of components. Several quantities are used to characterize Gaussian mixture models and ascertain whether random walks exist in capital markets. Empirical studies on China securities markets and Forex markets are used to demonstrate the proposed procedure. Empirical study showed that Gaussian mixture models can be used as an approximation of asset return distribution and that there are non-random walks in capital markets. Chaudhuri (2003) investigated whether stock-price indexes of emerging markets can be characterized as random walk or mean reversion processes. The ADF and PP test for a random walk in stock prices have insufficient power against the alternative hypothesis of mean reversion in small samples. They implement a panel based test that exploits cross-sectional information from seventeen emerging equity markets during the period, January 1985 to April 2002. They found a positive speed of reversion with a half-life of about 30 months. These results are similar to those documented for developed markets. Pandey (2003) analysed three popular stock indices to test the efficiency of Indian Stock market for the period January 1996 to June 2002. The Runs test and the autocorrelation test are used for the analysis. The study found that Indian stock market was inefficient in weak form. The autocorrelation analysis indicated that the behavior of share prices does not confirm the applicability of the random walk model in the India stock market. Thus there are undervalued securities in the market and the investors can always gain returns by correctly picking them.
Hasan (2004) employed a battery of statistical tests to examine the RWH. The daily data of the Dhaka Stock Exchange, the major equity market of Bangladesh, over a period of January 1990 to December 2000 was used in the study. Results based on the random walk model and unit root tests show that the null hypothesis of randomness cannot be rejected and stock prices have a significant random walk or permanent component. The analysis of autocorrelation functions indicates mean-reversion behavior of stock returns in most cases albeit with stock returns exhibiting some memory and predictable components during the bubble and post-speculation periods. The evaluation of the EGARCH-M model suggests significant asymmetric and leverage effects during the sub-period of speculative bubbles of 1996–1997. The BDS test (after the initials of W. A. Brock, W. Dechert and J. Scheinkman) indicates evidence of nonlinear long-term dependence during the pre-speculation period, while during the speculation and post-speculation periods the null hypothesis of nonlinear independence was not rejected. Based on these evidences, it was concluded that Dhaka Stock Exchange is weak-form inefficient. Robinson (2005) explored seasonal patterns on Jamaica stock Exchange (JSE). An analysis of daily returns on all stocks listed on the JSE over the period January 2, 1992 to December 31, 2001 was used in this study. The autocorrelation tests, Runs test, tests for a day-of-the-week effect and tests for a month of-the-year effect are used. The results of the autocorrelation and Runs tests suggest that like a number of other emerging markets, the hypothesis of randomness in stock returns on the JSE is rejected for at least sixty five (65) percent of the stocks listed on the JSE, suggesting that the JSE is not a weak form efficient stock market. Ellis and Wilson (2005) developed an integrated approach to forecast foreign exchange rates by incorporating some principles underlying
long-term dependence. The paper utilised the random-walk framework to develop a stochastic forecast model wherein the sign (positive or negative) and magnitude (strong or weak) of dependence can be separately controlled. The integrated model demonstrates superior forecast performance over a conventional random walk. Using spot log prices and log price changes for the USD/AUD exchange rate, the initial outcomes of the study suggest that a priori knowledge of the underlying sign and magnitude of long-term dependence yields out-of-sample forecasts superior to those of a random walk model. The findings of the study have important implications for managerial finance as they provide important insights on expected future currency returns with potential advantages in currency hedging and/or timing of international capital flows. Humphrey and Lont (2005) examined the RWH for aggregate New Zealand share market returns, as well as the CRSP NYSE-AMEX (USA) index during the 1980-2001 periods. The variance-ratio test is used to find evidence to support the rejection of the RWH. They found evidence which suggest the behaviour of share prices to be time-dependent in New Zealand. They also found evidence that indices based on large capitalisation stocks are more likely to follow a random walk compared to those based on smaller stocks. For USA index, the results show a stronger evidence of random behaviour in the sample period. Ahmad et al. (2006) examined for weak form EMH using daily data for stock indices of NSE – Nifty and the BSE-Sensex for the period of 1999-2004. The RWH for the Nifty and the Sensex stock indices was rejected. Both stock markets have become relatively more inefficient in the recent periods, and have high and increasing volatility. Non-parametric tests also indicate that the distributions of the variables are not normal and the deviation from normality has become higher in recent years. Both the indices show a negative autocorrelation at
lag 2, indicating over-reaction one day after information arrival, followed by a correction on the next day. The study suggests immediate dissemination of information on foreign institutional investor trades and equity holding and the need to improve free float of equity to move towards efficiency. Omran and Farrar (2006) examined the efficiency of the emerging stock markets in the Middle Eastern countries. The paper investigates the validity of the RWH and tests for calendar effects in five major Middle Eastern emerging markets by applying a range of statistical and econometrics. In general, the results reject the RWH for all markets and instead suggest that the stock returns in these countries exhibit calendar effects. However, the evidence for the Israel Tel100 stock market shows greater support for the RWH compared with the other markets in the sample. The limited support for weak form efficiency in Middle Eastern emerging markets implies a degree of predictability of returns for these emerging stock markets, which may be a factor in their attractiveness to global investors. Atmeh and Dobbs (2006) investigated the performance of moving average trading rules in an emerging market context- Jordanian stock market. The conditional returns on buy or sell signals from actual data are examined for a range of trading rules. These are compared with conditional returns from simulated series generated by a range of models i.e. random walk with a drift, AR (1) and GARCH-(M) and the consistency of the general index series with these processes is examined. Sensitivity analysis of the impact of transaction costs is conducted and standard statistical testing is extended through the use of bootstrap techniques. The empirical results show that technical trading rules can help in predicting market movements, and that there is some evidence that rules may be profitable after allowing for transactions costs, although there are some caveats on this. Rakesh and Parikshit (2007) used ADF,
PP and the KPSS tests to examine the weak form efficiency of two of the Indian stock indices. The data was collected from the Datastream data terminal from Macquarie University. The time period for BSE is from 24 May 1991 to 26 May 2006 and for NSE 27 May to 26 May 2006. The results of these tests found that these markets are not weak form efficient. These results support the common notion that the equity markets in the emerging economies are not efficient.

Pukthuanthong et al. (2007) examined the profitability of currency futures trading rules that assume that spot exchange rates can be adequately modeled as a drift less random walk. Two random walk currency futures trading rules are simulated over all available data from the period, 1984-2003. In both cases, the investor buys currencies selling at a discount and sells those selling at a premium, as the RWH implies. The two rules differ only in the way they allocate the hypothetical investor’s resources among long and short foreign currency positions. The results show that an investor who used these trading strategies over the past decade would have enjoyed large cumulative gains, although periods of profit were interrupted by periods of substantial loss. The findings encourage the hope that profitable random-walk-based strategies for currency futures trading can be devised. The simulation results have important implications for those willing to hedge, borrowers, and speculators. Tully and Lucey (2007) investigated macroeconomic influences on gold using the asymmetric power GARCH model (APGARCH-asymmetric power GARCH model). This paper examined both cash and futures prices of gold and significant economic variables over 1983–2003 period, with special focus on two periods, “around the 1987 and 2001” equity market crashes. To estimate the goodness of fit of each model, likelihood ratio tests are used to assess the significance of each model and provide the best fit for the data. The
results suggest that APGARCH model provides the most adequate description for the data, with the inclusion of a GARCH term, free power term and unrestricted leverage effect term. This paper is the first of its kind to undertake an APGARCH investigation of the gold price. The role of the dollar in gold is confirmed but few other macroeconomic variables have an impact.

Hoque et al. (2007) examined the RWH for eight emerging equity markets in Asia: Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. They used weekly data, which are collected from Data Stream from April 1990 to February 2004. The hypothesis was tested with two new variance ratio tests– Wright's rank and sign and Whang–Kim sub sampling tests–as well as the conventional Lo–MacKinlay and Chow–Denning tests. They found that the stock prices of these eight Asian countries do not follow random walk with the possible exceptions of Taiwan and Korea. Katsikas (2007) investigated the relationship between volatility and autocorrelation in major European stock index futures markets. The exponential autoregressive model with conditionally heteroskedastic errors (EAR-GARCH) was used. The evidence points to a negative relationship between volatility and autocorrelation. Specifically, autocorrelation is low during volatile periods and high during calm periods. The limitation of this study is the lack of a theoretical justification for the observed relationships in futures markets, an area where future research should be directed. The observed relationships suggest that futures prices are non-linearly predictable so that short-term trading could produce abnormal returns. The paper documents a negative relationship between volatility and autocorrelation in major European futures markets. Bhattacharya and Singh (2007) used Indian stock futures data to explore EMH and un-biasedness. The Indian stock futures market
provides an unparalleled case for exploring issues involving expectation and efficiency. Besides analyzing efficiency hypothesis and unbiasedness of stock futures market using cointegration and error correction model, the degree of efficiency is further investigated after explicitly modelling the market (expansion or contraction) through the first-order Markov switching set-up. The results based on Markov switching analysis showed that relatively longer time horizon is more effective in eliminating arbitrage opportunities than the short run. Magnus (2008) examined the weak-form EMH of Ghana Stock Exchange (GSE) which is a developing market. The daily return of the Databank Stock Index (DSI) is used over a 5-year period from 1999 to 2004. The Random walk and GARCH (1,1) models are used for analysis. The study found that the returns series exhibit volatility clustering which is an indicator of market inefficiency. Jarrett (2008) studied the capital market efficiency by using the markets in Hong Kong, the third largest exchange in the Pacific-Basin of Asia. The weak form of the efficient markets hypothesis is examined to indicate its usefulness in terms of the results of this study. The study used the data of 601 firms listed on the Hong Kong stock exchange in 2002. The results found that the model identifies predictive short-term properties that exist in the data of returns of Hong Kong Exchanges for the period studied. The conclusions are limited to those firms studied and the time period covered. For the securities exchanges in Hong Kong, evidence indicates that the weak form of the EMH does not characterize the trading market. Lim (2008) examined the relative efficiency of eight economic sectors in the Malaysian stock market and the impact of the 1997 Asian financial crisis on the reported sectoral efficiency. The study used the rolling bicorrelation test statistic that is designed to detect nonlinear predictability in stock returns series. The results show that for the
sample period of 1 January 1994 to 31 October 2006, the sector of tin and mining is found to be the most efficient sector, while the properties sector experiences the most persistent deviations from random walk over time. The subsequent sub-periods analysis reveals that the highest inefficiency occurs during the crisis period for all economic sectors except tin and mining. However, all these seven crisis-stricken sectors managed to stage a turnaround in the USD pegged period where capital controls were imposed by the Malaysian government. The Malaysian experience demonstrates that credible policy actions to calm the markets and restore investors’ confidence ought to be the priority during turbulent period to avoid deterioration in the level of market efficiency. This provides useful input for market regulators. The occurrence of market crash or financial crisis is one possible contributing factor of market inefficiency. Alberg et al. (2008) performed the analysis of the mean return and conditional variance of Tel Aviv Stock Exchange (TASE) indices using various GARCH models. The prediction performance of these conditional changing variance models was compared to asymmetric GJR and APARCH models. They also quantify the day-of-the-week effect and the leverage effect and test for asymmetric volatility. The data consist of 3058 daily observations of the TA251 index from the period 20th October 1992 to 31st May 2005 and 1911 daily observations of the TA1002 index from the period 2nd July 1997 to 31st May 2005 that were obtained from finance.yahoo.com. The results show that the asymmetric GARCH model with fat-tailed densities improves overall estimation for measuring conditional variance. The EGARCH model using a skewed Student-t distribution is the most successful for forecasting TASE indices. Azad (2008) tested the random walk and efficiency hypothesis for 12 Asia-Pacific foreign exchange markets. The hypothesis is tested using individual as
well as panel unit root tests and two variance-ratio tests. The study covers the high (daily) and medium (weekly) frequency post-Asian crisis spot exchange rate data from January 1998 to July 2007. With the daily data, both types of unit root tests identify unit root components for all the series and two variance-ratio tests provide the evidence of martingale behavior for majority of the exchange rates tested. With the weekly data, panel unit root tests identify unit root component for the exchange rates and, the unit root tests on a single series basis identify unit root component for 10 foreign exchange markets. However, the variance-ratio tests reject the martingale null for the majority of the exchange rates when using weekly data. Benjelloun and Squalli (2008) analysed whether the use of general indexes may mask sectoral efficiencies by investigating the RWH in the equity markets of Jordan, Qatar, Saudi Arabia, and the United Arab Emirates. The study applied the multiple variance ratio test and the Runs test to each equity market’s weekly general and sectoral indexes. The results show the evidence of inconsistencies in three of the five analyzed equity markets when testing the RWH. The findings in this paper provide empirical evidence supporting the use of sectoral indexes in lieu of general indexes in equity market analyses. These results have important financial and policy implications and would be of interest to investors, financial managers, and policy makers.

Mishra and Paul (2008) examined the integration and efficiency of Indian stock and foreign exchange markets. The study employed time series ordinary least square regression, Unit Root test, Grangers causality test, Vector Auto Regression techniques on monthly data of stock return and exchange rate return for the period spanning from February 1995 to March 2005. The study found that the stock indices return (Rsensex and Rnifty) are near normal whereas exchange rate return
is not normal and more peak. The stock return and exchange rate return are positively related. From the Granger’s causality test, it was found that there is no causality for the return series of stock indices and exchange rate except return Nifty and return exchange rate. Weak form of market efficiency hypothesis is also corroborated for stock and foreign exchange markets. Lim et al. (2008) examined the weak-form efficiency of 10 Asian emerging stock markets. Using a battery of nonlinearity tests, the statistical results reveal that all the returns series still contain predictable nonlinearity even after removing linear serial correlation from the data. Further the whole sample is divided into a set of 73 equal-length non-overlapped sub-samples of length 50 observations. The Hinich-bicorrelation test was applied and it shows that the 10 Asian returns series follow a pure noise process for long periods of time, only to be interspersed with brief periods of strong nonlinear dependence, suggesting that these markets are weak-form efficient. Baghestani (2009) assessed whether this benchmark is unbiased and directionally accurate under symmetric loss. The focus is on the random walk forecasts of the dollar/euro for 1999-2007 and the dollar/pound for 1971-2007. A forecasting framework to generate the one- to four-quarter-ahead random walk forecasts at varying lead times was designed. This allows comparing forecast accuracy at different lead times and forecasting horizons. The paper shows that forecast accuracy improves with a reduction in the lead time but deteriorates with an increase in the forecast horizon. More importantly, the random walk forecasts are unbiased and accurately predict directional change under symmetric loss and thus are of value to a user who assigns similar cost to incorrect upward and downward move predictions in the exchange rates. The exchange rate forecasting framework presented in this paper allows the evaluation of the random walk forecasts in terms of directional accuracy.
which has not been done before. Charles and Darne (2009) examined the RWH for the Shanghai and Shenzhen stock markets for both A and B shares. The data used in this study are daily closing price stock indices for Chinese stock exchanges in Shanghai and Shenzhen for A and B shares. The data was collected from Thomson Financial Data stream. The time period covered from January 3, 1992 to July 6, 2007 for the Shanghai A and the Shanghai B, respectively, and from October 5, 1992 to July 6, 2007 for the Shenzhen A and B. The hypothesis was tested with new multiple variance ratio tests – Whang-Kim sub sampling and Kim’s wild bootstrap tests – as well as the conventional multiple Chow-Denning test. They found that Class B shares for Chinese stock exchanges do not follow the RWH, and therefore are significantly inefficient. The Class A shares seems more efficient. Mishra (2009) examined the informational efficiency of Indian capital market, particularly the efficiency of BSE over a period of 18 years spanning from Jan, 1991 to Jan, 2009 using Random Walk model and Generalised Autoregressive Conditional Heteroscedasticity (GARCH) models. The results show that market is inefficient in weak form. This inefficiency may be due to stock market anomalies and market volatility. Market inefficiency is also, an indicative of sub-optimal allocation of portfolios into capital market of India. Hamid et al. (2010) examined empirically the weak-form market efficiency of the stock market returns of Pakistan, India, Sri Lanka, China, Korea, Hong Kong, Indonesia, Malaysia, Philippine, Singapore, Thailand, Taiwan, Japan and Australia. They used monthly observations for the period January 2004 to December 2009. Autocorrelation, Ljung-Box Q-statistic Test, Runs Test, Unit Root Test and the Variance Ratio are used to test the hypothesis that the stock market follows a random walk. The results show that monthly returns are negatively skewed and leptokurtic. In
aggregate they concluded that the monthly prices do not follow random walks in all the countries of the Asia-Pacific region. The investors can stream of benefits through arbitrage process from profitable opportunities across these markets. Srinivasan (2010) examined the RWH to determine the validity of weak-form efficiency for two major stock markets in India. The study uses daily observation over the span from 1 July 1997 to 31 August 2010, comprising a total of 3244 observations. The RWH is examined using unit root tests namely, Augmented Dickey-Fuller test and the Phillips-Perron test. The results suggest that the Indian stock markets do not show characteristics of random walk and therefore Indian stock market is in efficient in the weak form implying that stock prices remain predictable. Jarrett (2010) examine the existence of certain time series characteristics in daily stock returns of four small Asian (Pacific basin) financial markets. The study analysed the daily variations in financial market data obtained from the Sandra Ann Morsilli Pacific-basin Capital Markets Research Center (PACAP). The study found that for short-term (daily) changes, the markets of four of the smaller Pacific-basin stock markets have predictable properties, which leads to the conclusion that the weak-form EMH does not hold for these markets. The study is limited to those firms and exchanges studied and the time period covered. Tripathi and Sethi (2010) examined the integration of the Indian stock market with the stock markets of Japan, the United Kingdom, the United States and China over the period ranging from 1 January 1998 to 31 October 2008 using Johansen and Engle-Granger co-integration tests and Granger’s causality test. The analysis of daily data shows that the Indian stock market is integrated with the US stock market, but not with that of Japan, the UK and China. Unidirectional causality is found in most cases. Abdmoulah (2010) weak-form efficiency dynamics of 11
Arab stock markets using GARCH-M (1,1) approach. The data include daily prices of the national indexes of Saudi Arabia, Kuwait, Tunisia, Dubai, Egypt, Qatar, Jordan, Abu Dhabi, Bahrain, Morocco and Oman. The result shows that these markets are highly sensitive to past shocks indicating that undesirable shocks exert their influence for a long period. Although, many markets have experienced sub-periods of efficiency improvement while Tunisia, Oman and Morocco markets’ efficiency is highly unstable without any tendency towards weak-form efficiency.

Gupta and Siddiqui (2010) used non-parametric (Kolmogrov–Smirnov normality test and Runs test) test and parametric test (Auto-correlation test, Auto-regression, ARIMA model) to test weak-form efficiency. The daily data for stock indices of the NSE for the period of 1 January 2000 to 31 October 2008 was examined. It was found that the observed series are not independent and they are serially correlated. This shows that market was inefficient in weak form. Khan et al. (2011) tested the efficiency of the Indian capital market using the daily closing prices of the of NSE and BSE over the period of 1 April 2000 to 31 March 2010 by employing Runs test. The result shows that Indian capital market is weak form inefficient.

Guidi et al. (2011) examined the weak form of the EMH for Central and Eastern Europe (CEE) equity markets for the period 1999–2009. This study used autocorrelation analysis Runs test and variance ratio test. The results show that stock markets of the CEE do not follow a random walk process. They also tested the presence of daily anomalies for the same group of stock markets using GARCH-M model. Results indicate that day-of-the-week effect is not evident in most markets except for some. Overall results indicate that some of these markets are not weak and an efficient and informed investor can make abnormal profits by studying the past prices of the assets in these markets. Mishra et al. (2011) studied
the presence of nonlinear dependence and deterministic chaos in the rate of returns series for six Indian stock market indices. The data used in this study are spot price based daily returns on equity indices gathered from the Capital Line database provided by the Center for Monitoring Indian Economy (CMIE). Six equity indices used in this study are taken from two different stock exchanges NSE and BSE i.e S&P CNX Nifty, CNX IT Index, Bank Nifty Index, BSE SENSEX, BSE 200 and BSE 100 Index. The overall result from the analysis suggests that the returns series do not follow a random walk process. Rather it appears that the daily increments in stock returns are serially correlated and the estimated Hurst exponents are indicative of marginal persistence in equity returns. Result from the test of independence on filtered residuals suggests that the existence of nonlinear dependence, at least to some extent, can be attributed to the presence of conditional heteroskedasticity. Bley (2011) examined weak-form efficiency of Gulf Cooperation Council by using daily, weekly, and monthly index data for the 10-year period 2000–2009. Various variance ratio test specifications with specific homo- and heteroskedasticity assumptions found evidence of nonlinear dependence for the daily data, supporting the evidence in favor of a rejection of the random walk. A correction procedure for thin and nonsynchronous trading was applied and failed to produce significantly different results. An ARCH based model building procedure, conditional heteroskedasticity models are applied to the log return series. The results show that the RWH is generally rejected for daily but differences appear across markets using weekly and monthly data. The increased involvement of foreign institutional investors may play a role in the increased serial correlation in stock returns in the most recent period. Ntim et al. (2011) investigated and compare the weak-form efficiency of a set of 24 African
continent-wide stock price indices and those of eight individual African national stock price indices. The Variance-ratio tests based on ranks and signs were used to examine the weak-form efficiency of the 32 stock price indices. It was found that irrespective of the test employed, the returns of all the 24 African continent-wide stock price indices are non-normally distributed compared to the eight individual national stock price indices. Jawadi and Bellalah (2011) investigated the EMH for oil markets while testing for whether oil price dynamics depend on stock market fluctuations or not. The study used nonlinear econometric models for four developed and emerging countries: France, the USA, Mexico and the Philippines. The findings show strong evidence of significant linkages between oil and stock markets for all the countries under consideration. The study pointed out an asymmetrical mean-reversion between oil and stock markets that occurs in a nonlinear manner. They reject the informational efficiency hypothesis for oil markets. This paper developed a new nonlinear framework which improved the investigation of oil-stock market linkages. Vats and Kamaiah (2011) used both parametric and non-parametric tests to examine the behavior of weekly return of eight currencies relative to Indian Rupee in post liberalization period. The bootstrap resampling technique was used to calculate the significance levels of variance ratio statistics. The results show strong evidence of rejection of random walk for US Dollar and Hong Kong Dollar relative to Indian Rupee. Further, there is mixed evidence of random walk for Singapore Dollar. However, for other five currencies random walk could not be rejected. Overall, there is evidence against weak form efficient foreign exchange market in India. Nisar and Hanif (2012) examined the weak form of EMH on the four major stock exchanges of South Asia which include India, Pakistan, Bangladesh and Sri Lanka. The historical index
numbers of daily, monthly and weekly are collected from 1997 to 2011. They applied Runs test, serial correlation, unit root and variance ratio test to see whether South Asia markets are efficient in weak form. The results found that none of the four major stock markets of south-Asia follows random walk and hence all these markets are not the weak form of efficient market. Rehman et.al (2012) examined weak-form of efficiency of emerging South Asian Stock Markets i.e. Karachi Stock Exchange (KSE) of Pakistan, Bombay Stock Exchange (BSE) of India and Colombo Stock Exchange (CSE) of Sri Lanka. They used 13 years of daily closing prices of indices of these stock exchanges for the period of 1 July 1998 to 10 May 2011. They applied the autocorrelation and unit root tests for analysis and found that all markets are inefficient except CSE market. Khan and Vieito (2012) examined the impact of stock exchange mergers on informational market efficiency. They focused on the merger of Bolsa de Valores de Lisboa e Porto (Portuguese Stock Exchange) with Euronext in 2002 (that created Euronext Lisbon). To investigate this they performed numerous statistical tests: serial correlation test (ACF test), Runs test, unit root test (Kwiatkowski, Philips, Schmidt, & Shin, 1992), multiple variance ratio test (Chow & Denning, 1993) and ranks and signs test (Wright, 2000). The results indicate that the Portuguese Equity Market is inefficient in weak form during premerger period implying that investors possessed an opportunity to earn abnormal returns though small in magnitude. Patel et al (2012) provided the evidence of weak form of inefficiency of the selected Asian stock markets. The daily closing price of stock is taken from 1 January 2000 to 31 March 2011 and the sample was divided in three interval periods. They applied various tests like Runs test, unit root test, variance ratio test and auto correlation test. The overall results from the empirical analysis suggest
that the stock markets under study are weak-form inefficient. Ashikh (2012) investigated the existence of the RWH and the existence of the day-of-the-week effects of one of the largest stock markets in the Middle East and North Africa; the Saudi Stock Exchange (SSE). The parametric and non-parametric tests are used for the analysis. The results indicate that the SSE returns exhibit significant linear serial dependence. The hypothesis of market efficiency has been strongly rejected based on the results from the linearity tests. The results also show evidence of day-of-the-week effects in the SSE both in mean (returns) and variance (volatility) equation. Therefore, it is concluded that SSE do not follow RWH.

Gahlot and Datta (2012) examined the impact of the future of trading on volatility as well as the efficiency of the stock market of BRIC (Brazil, Russia, India and China) countries. This study also investigated the presence of day-of-the-week effect in BRIC countries’ stock market. This study used closing prices of IBrx-50 for Brazil, RTSI for Russia, Nifty for India and CSI300 for China to represent the stock market of BRIC countries. The Runs and ACF tests are used to see impact on market efficiency. GARCH M model is used to see the impact on volatility and day-of-the week effect. The insignificant coefficient of variance in the conditional mean equation of GARCH M implies that the market doesn’t provide higher returns during the high volatility period. The results of the Runs test showed that the Russian stock market became efficient after introduction of future trading. However, ACF showed no effect of introduction of future trading on autoregressiveness of stock returns. The result of GARCHM indicates that future trading led to reduction in the volatility of the Indian stock market. There are some evidences of presence of day-of-the-week effect in the Indian stock market. Jiang and Tian (2012) examined the extract forward variance from option prices
following a model-free approach and empirically test the RWH. The results from standard orthogonality tests supported the martingale restriction, further results from autoregressive regressions rejected the martingale restriction as daily changes in forward variance are found to exhibit negative autocorrelation. However, this anomalous pattern of negative correlation is fully explained by illiquidity effects. Ayadi (2013) characterized the behavior of the naira/dollar foreign exchange rate series over the period 1999 through 2006 to determine if the process generating the series has long memory which is a special case of fractional Brownian motion. The existence of long memory contradicts the notion of market efficiency. The paper employed the modified rescaled range R/S test which is proposed by ‘Lo’ to test the null hypothesis that daily and weekly NGN/USD exchange rates from 1999 through 2006 exhibit short-memory process. The second test that was also employed is the Geweke-Porter-Hubak (GPH) test. The results show that long memory is present in daily and weekly foreign exchange level series of the Nigerian naira for the period sampled. This evidence implies that the Nigerian foreign exchange market may not be efficient. Thus, it is possible for investors to realize abnormal profit by taking an investment position based on predicted exchange rates.
3.1.3 Mixed Empirical Evidences of RWH


Girmes and Benjamin (1974) introduced two tests i.e. Number of Superior Vertices and Index of Maximum Distance for investigating the RWH. The daily closing prices of 543 stocks and shares traded at the London Stock Exchange for a period of about 600 days from October, 1968 to April, 1971 was used in the study. The data was corrected for trends and non-statistical fluctuations. The results shows that irrespective of the test methods used about 20% of the 543 share prices do not vary according to a random walk while about 20% of the 543 share prices seem to behave liked a genuine random walk. Ayadi and Pyun (1994) applied Lo-MacKinlay variance ratio test to examine the market efficiency of the Korean Stock Exchange (KSE). The KSE is chosen because it represents a typical emerging stock market. The results show that under the assumption of heteroskedastic error term, the RWH is rejected. However, with heteroskedastic stochastic disturbance term, they could not reject the hypothesis of random walk for daily data. When the test is applied to longer horizons such as weekly, monthly, 60-day and 90-day interval data, they accepted the RWH. There is also evidence that suggests the presence of spurious autocorrelation and heteroskedasticity in the market. These could be due to official intervention and nonsynchronous trading in the market. Abeyratna and Power (1995) examined the behavior of share prices of 20 shares traded in Colombo stock exchanges. They used daily share price data from April 1993 to July 1994. They applied Runs test and serial correlation test.
They found negative and insignificant serial correlation in the observed price series. The Runs test result show that 60% of the securities show randomness in the price series. The empirical evidences gave contradictory results and this is because of time span and data used in the study. Chang and Ting (2000) used Lo and MacKinlay variance-ratio test to examine random walks in Taiwan's 1971-1996 stock prices. The empirical results showed that with weekly value-weighted market index, the null hypothesis of random walk is rejected, and the autocorrelation decreases after the 1990 speculation fad and is inversely related to the range of price limits. The study also found that the RWH cannot be rejected with monthly, quarterly and yearly value-weighted market indexes. Gilmore (2003) examined the existence of weak-form efficiency in the equity markets of the three main Central European transition economies namely the Czech Republic, Hungary, and Poland for the period July 1995 through September 2000, using weekly investable and comprehensive indexes developed by the International Finance Corporation. The results from univariate and multivariate tests provide some evidence that stock prices in these exchanges exhibit a random walk, which constitutes evidence for weak form efficiency. This differs in some cases from studies using data for the initial years of these markets. The variance ratio test yields mixed results concerning the random-walk properties of the indexes. A model comparison test compares forecasts from a NAIVE model with ARIMA and GARCH alternatives. Results from the model-comparison approach are consistent in rejecting the RWH for the three Central European equity markets. Jo Lima and Tabak (2004) investigated the RWH for China, Hong Kong and Singapore using variance ratio tests, robust to heteroskedasticity and bootstrap technique to customize percentiles for inference purposes. The daily return from June 1992 to December 2000 was
used in the study. It was found that Class A shares for Chinese stock exchanges and the Hong Kong equity markets are weak form efficient. However, Singapore and Class B shares for Chinese stock exchanges do not follow the RWH, which suggests that liquidity and market capitalization may play a role in explaining results of weak form efficiency tests. Worthington and Higgs (2006) investigated the weak-form market efficiency of Asian equity markets. The daily returns of ten emerging market such as China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Taiwan and Thailand and five developed markets such as Australia, Hong Kong, Japan, New Zealand and Singapore are used. The econometric models - serial correlation coefficient test, Augmented Dickey-Fuller test, Phillips-Perron test, Kwiatkowski test, Phillips test, Schmidt test and Shin test for unit root and multiple variance ratio tests and Non-parametric Runs test are used to examine the RWH. The unit root tests suggest weak-form efficiency in all markets, with the exception of Australia and Taiwan. The results from the more stringent variance ratio tests indicate that none of the emerging markets are characterised by random walks and hence are not weak-form efficient, while only the developed markets in Hong Kong, New Zealand and Japan are consistent with the most stringent random walk criteria. Hung (2009) employed single and multiple variance ratio tests to examine the weak-form EMH of A and B-shares on the Shanghai and Shenzhen exchanges in Chinese stock market. The study also examines the influence of the release of investment restriction of B-share markets on market efficiency. The stock price data in this study were obtained from the Data stream database and a comprehensive dataset that comprises closing price indices for Chinese main stock market was used. The four Chinese stock market price indices were the Shanghai A-share index (SHAI), Shanghai B-share index
(SHBI), Shenzhen A-share index (SZAI), and Shenzhen B-share index (SZBI) used in the study. The sample period covers nearly 10 years, from 5th April 1996 to 30th December 2005, containing a total of 2344 daily observations for each stock index price series. To examine the impact of releasing restrictions on investment in the B-share markets on overall market efficiency, the sample period is divided into two sub-samples, each including 1172 observations. For the whole sample period, the weak-form EMH is only supported for Shanghai A-shares, and is not supported for the remaining shares. For the sub-sample period, the Shenzhen A-share and B-shares of both exchanges being rejected for the weak-form EMH. Kumar (2013) tested the finite sample properties of the automatic variance ratio (AVR) test and suggest suitable measure to improve its small sample properties under conditional heteroskedasticity and apply it to test the martingale hypothesis in the stock prices of the Portugal, Ireland, Italy, Greece and Spain (PIIGS economies) markets. The Monte Carlo experiments used to test the small sample properties of automatic variance ratio (AVR) test. The study uses AVR test on daily and weekly data of the indices to investigate their martingale behaviour. The study also applied moving subsample approach to examine the dynamic behavior of stock prices and to obtain inferential findings robust to possible structural changes and presence of influential outliers. The author found that weighted bootstrap procedure significantly improves the small sample properties of AVR tests under conditional heteroskedasticity. The results provided evidence in support of the weak-form efficiency of Italy and Spain. But Portugal, Ireland and Greece exhibit signs of long memory in the stock prices. All indices also exhibit chaotic characteristics.
3.2 Empirical Evidences of Semi-strong EMH

Information plays a very important role in security markets and it aids in the establishment of security prices. The relationship between security prices and publically available information is widely debated and empirically examined by many economist and researchers. Vast literature is available on semi-strong EMH. A short summary of the findings of the literature is presented below.

3.2.1 Empirical Evidences Supporting Semi-strong EMH

The studies such as Beaver (1968), Fama et al. (1969), May (1971), Foster (1973), Jordan (1973), Nichols and Tsay (1979), Aharony and Swary (1980), Grant (1980), Kormendi and Lipe (1987), Rao (1994), Kabir and William (1996), Teets and Wasley (1996), Fama (1998), Forde (1999), Manickaraja (2004), Forde and Rydge (2006), Liu (2007), Hatemi-J and Morgan (2009) and Iqbal and Farooqi (2011) examined various issues of price responses to corporate announcements and found that the stock market is efficient in reflecting the publicly available information. Therefore, the above studies reported that the stock market is efficient in the semi-strong form.

Beaver (1968) examined the extent to which common stock investors perceive earnings to possess informational value. The study directs its attention to investors’ reaction to earnings announcements, as reflected in the volume and price movements of common stocks in the weeks surrounding the announcement date. The study was based upon a sample of annual earnings announcements released by 143 firms during the years 1961 through 1965. 143 firms gave rise to 506 annual earnings announcements. The date of the earnings announcement was obtained from the Wall Street Journal Index. It was found that investors look directly at
reported earnings and do not use other variables to the exclusion of reported earnings. The evidences also indicated that news announcements occurring prior to the earnings report do not entirely pre-empt the information content of reported earnings. Fama et al. (1969) examined the process by which common stock prices adjust to the information that is implicit in a stock split. The event study methodology is employed. The data covers only common stocks listed on the New York Stock Exchange. The samples included in the study based on the rules require that a split security must be listed on the exchange for at least twelve months before and twelve months after the split. The study used 940 splits meeting these criteria for the period, January, 1927 to December 1959. They found that in the past, stock splits have very often been associated with substantial dividend increases. The evidence indicated that the market realizes this and uses the announcement of a split to re-evaluate the stream of expected income from the shares. Moreover, the evidence indicated that on an average the market's judgments concerning the information implications of a split are fully reflected in the price of a share at least by the end of the split month but, most probably, almost immediately after the announcement date. Thus the results of the study lend considerable support to the conclusion that the stock market is "efficient" in the sense that stock prices adjust very rapidly to new information. May (1971) examined whether quarterly accounting data, in the form of public earnings announcements, have a significant effect on investor decisions as reflected in market price changes? Whether there is a significant difference between the influence on investors of quarterly and annual earnings announcements? The period selected for this study was from July 1964 through June 1968. The period included a moderately "bullish" market through April 1966, a brief but pronounced
"bear" market through October 1966, and a segment of the dramatic upswing that persisted through January 1969. A sample of 105 firms was selected from among all firms whose common stocks were listed on the American Stock Exchange in the fourth calendar quarter of 1965. The first finding of the study was that price changes in the weeks of quarterly earnings announcements are greater than average price changes. But the second finding of the study states that relative price-change responses to quarterly earnings are not significantly less than responses to annual earnings, leads to the conclusion that investors may be unaware of, or unable to take account of, the difference in quality (reliability) of quarterly and annual accounting data. Foster (1973) examined the stock market reaction to estimates of annual earnings per share by company officials. These estimates are made after the end of the financial year, but before the release of audited earnings figure. The Sharpe model used in this paper is a single index model. The Wall Street Journal Annual Index for 1968 to 1970 was used to identify instances in which, after the end of each financial year, a company official publicly announced an estimate of EPS before the release of the preliminary earnings report. The result was based on 68 instances of estimates of EPS by company officials in the period, 1968 to 1970. The study found that on the basis of volume and price studies, both individual investors and the aggregate market consider pre-audited estimates of EPS to have informational content. Once the estimate is made public, stock prices rapidly adjust such that a trading strategy based on these estimates does not earn abnormal returns. Jordan (1973) examined the effect of earnings reports on changes in expectations as reflected in share price movements. The sample consists of 45 firms chosen randomly from Forbes' 21st Annual Report on American industry. The period covered by this study was from April 1, 1963 to December 31, 1968, the
former date selected because it was the first complete year for which daily price data were available. They applied regression and variance ratio test for analysis. The mean and mean absolute, was found to be useful in capturing the impact of new quarterly earnings information on share prices. The results seem to indicate that the market evaluates third quarter and annual earnings reports differentially from the first and second reports. The results also indicated that the share prices of high growth companies adjust to earnings information differently than do the shares of medium and low growth firms. Nichols and Tsay (1979) investigated the information content of voluntarily disclosed long-range earnings forecasts by executives by determining security return reactions. In order to isolate the price reaction of individual securities to forecasts, they used the market model to control for price changes resulting from general market movements. The sample for the study included firms for which forecasts of annual earnings were reported in the Wall Street Journal during the calendar year 1968-73. The results show that average abnormal returns in the announcement week and cumulative average abnormal returns over the seventeen-week period indicated that the forecasts had information content. The results suggest that disclosure of long-term executive forecasts of relatively small percentage changes in earnings would have little impact on investor expectations and equilibrium prices. Aharony and Swary (1980) attempted to resolve the empirical issue as to whether quarterly dividend announcements convey useful information beyond that provided by quarterly earnings numbers. The methodology used examines only those quarterly dividend and earnings announcements made public on different dates within any given quarter. This distinguishes earnings announcements that precede or follow from those that accompany dividend announcements. A sample of 149 industrial firms
was selected from those listed on the New York Stock Exchange. The abnormal performance of sample security was measured by market model. Findings on capital market reaction to the dividend announcements studied strongly support the hypothesis that changes in quarterly cash dividends provide useful information beyond that provided by corresponding quarterly earnings numbers. The results also support the semi-strong form of the efficient capital market hypothesis; that is, on the average, the stock market adjusts in an efficient manner to new quarterly dividend information. Grant (1980) assessed the differences in the information content of annual earnings announcements between a sample of OTC firms and a sample of NYSE firms. This study period is from 1960 to 1964. Total sample of 211 OTC firms which had 747 annual earnings announcements and 101 NYSE firms which had 336 announcements was considered in this study. Markowitz market model was employed in this study. The analyses supported the conclusion that the annual earnings announcements of OTC firms appear to possess more information content than those of the NYSE firms. When the announcement was made, it was found that the market reaction to the information contained in the report may be significant. Kormendi and Lipe (1987) examined whether the magnitude of the effect of unexpected earnings on stock returns is (positively) correlated with the present value of revisions in expected future earnings derived from a univariate time series model. The data consist of annual stock returns and earnings for 145 firms for the period 1947-80. The annual stock returns and prices are from the monthly Center for Research in Security Prices data base. The annual earnings are from the COMPUSTAT data base. The data consist of all firms reporting on a calendar-year basis that have complete time series for earnings and returns for the 1947-80 periods. By addressing the valuation implications of the
time-series properties of earnings, they uncover a new dimension to the information content of earnings and, in the process, found no evidence that the reactions of stock returns to unexpected earnings are excessively volatile. Rao (1994) examined the share price responses to announcement of dividend increase, bonus issue and equity rights and found that the Indian stock market is semi-strong form efficient. Kabir and William (1996) examined the stock market reactions to an involuntary adjustment to loan-loss reserves by the write-downs of Argentinean loans by major banks with Argentinean loan exposure. Event study was employed to investigate two pairs of hypotheses, namely, the new-information vs. information-leakage hypothesis and the rational-pricing vs. investor-contagion hypothesis by using daily stock market data. Sample banks are grouped into three portfolios - highly exposed multinational banks, mildly exposed regional wholesale banks and unexposed or nominally exposed regional consumer banks to test the investor-contagion effect. The results indicated that the stock market adjusts quickly to new information, thereby providing evidence of semi-strong-form market efficiency.

Teets and Wasley (1996) studied the use of firm-specific versus pooled cross-sectional regression estimation procedures in short-window accounting. The study focused on estimating earnings response coefficients. They constructed random samples of 75 firms each using COMPUSTAT quarterly data files covering from the 1971-1990. This 20-year period was broken down into four five-year sub periods (i.e., 1971-75, 1976-80, 1981-85, and 1986-90). The firms with quarterly earnings announcement dates and earnings per share data available from COMPUSTAT for at least of 15 of the sub period's 20 quarters, and continuous security return data available on the CRSP daily returns file, are included in a
sample in a sub period. The study found that short-window earnings response coefficients estimated from pooled time-series cross-sectional regressions are systematically smaller than corresponding averages of firm-specific coefficients estimated from time-series regressions. The cause is a negative relation between firm-specific earnings response coefficients and unexpected earnings variances. Fama (1998) analysed the finance literature on market efficiency, long-term returns, and behavioural finance. The review shows that market efficiency survives the challenge from the literature on long-term return anomalies. Consistent with the market efficiency hypothesis that the anomalies are chance results, apparent overreaction to information is about as common as under reaction and post-event continuation of pre-event abnormal returns is about as frequent as post-event reversal. Most important, consistent with the market efficiency prediction that apparent anomalies can be due to methodology, most long-term return anomalies tend to disappear with reasonable changes in technique. Forde (1999) examined the impact of opening rules on stock market efficiency. In particular, it contrasts the opening call on the Australian Stock Exchange (ASX) and the continuous open on the Jakarta Stock Exchange (JSX). The data used in this study are taken from the SEATS and JATS databases maintained by the Securities Industry Research Centre of Asia-Pacific SIRCA. Using the data from 14th November 1995 to 30th June 1997, a sample of 100 stocks in each market represents approximately 80% of the volume traded on the JSX and 40% of the volume traded on the ASX. The results suggest that the use of a call enhances market efficiency by increasing liquidity and lowering volatility at the open. The results also indicate that some of the benefits associated with a call accrue even when there is no trading at the call. These results suggest that the use of a call market at the open may add to the efficiency of the
JSX and other similar markets. Manickaraja (2004) found that the quarterly earnings announcements have information relevant for security valuation and the stock market uses this information and immediately reflect it in stock prices. Market reacts positively to positive information and negatively to the negative informations. Thus he concluded that the Indian stock market is semi-strong form efficient. Forde and Rydge (2006) analyzed the impact of call auction design on the efficiency of auction prices. On 18 March 2002, the Australian Stock Exchange introduced a new matching algorithm and began to disseminate indicative auction prices and indicative surplus volumes. The data used in this study was obtained from the SEATS database maintained by the Securities Industry Research Centre of Asia-Pacific (SIRCA). Intra-day data is obtained from 18 March, 2000 to 18 March, 2001 (pre-event) and from 18 March, 2002 to 18 March, 2003 (post-event). This provides a sample period covering 500 trading days. Variance ratio analysis indicates that return volatility is reduced post-event across the market, i.e., in both active and less active stocks. The results indicated that these changes significantly enhanced call auction price efficiency, especially in active stocks at the open. The efficiency gains are greatest when call auction prices are set after considering order imbalances and market pressure. The results indicate a significant noise in pre-open prices. As the market open approaches, this noise diminishes and price discovery occurs. Liu (2007) examined the international cross-listing and stock pricing efficiency. International cross-listing should subject stocks involved to ameliorated information environment in the host market, resulting in more information being revealed, fed back, and impounded into their prices at home and, thus, higher home-market pricing efficiency. Employing a simple non-parametric Runs test, documented that foreign cross-listings in the U.S. enhance home-market
stock pricing efficiency, net of market wide efficiency shifts in the concurrent period. In addition, the efficiency benefit applies equally well regardless of home-market development status or cross listing location. Hatemi-J and Morgan (2009) investigated whether the Australian equity market is informationally efficient in the semi-strong form with regard to interest rates and the exchange rate shocks during the period 1994-2006. There is evidence that the data are non-normal and that autoregressive conditional heteroskedasticity (ARCH) effects exist and in such circumstances, standard estimation methods are not reliable. A new method introduced by Hacker and Hatemi-J which is robust to non-normality and the presence of ARCH is applied. The results show that the Australian equity market is informationally efficient. Iqbal and Farooqi (2011) used an event study methodology to investigate the stock price reaction to public announcement of quarterly after tax profit by listed firms of Karachi Stock Exchange (KSE). By employing 5 year data on stock prices from January 2004 to August 2008 for 114 non-financial firms they found that there is no abnormal return post earnings announcement. Moreover the study provides evidence that there is a bigger element of surprise in bad news than in good news as the market reaction to bad news is stronger.
3.2.2 Empirical Evidences against Semi-strong EMH

Mahmoudi et al. (2011), Mlonzi et al. (2011), Mun et al. (2011), Rufus (2011), Gupta et al. (2012), Blouin (2012), Kamal et al. (2012), Baik et al. (2013) and Malhotra et al. (2013) have reported that stock prices do not reflect the content of corporate announcement and therefore, they concluded that the stock market is not efficient in the semi-strong form.

Ball and Brown (1968) assessed the usefulness of existing accounting income numbers by examining their information content and timeliness. Income numbers for 1946 through 1966 were obtained from Standard and Poor's Compustat tapes. The distributions of the squared coefficients of correlation between the changes in the incomes of the individual firms and the changes in the market's income index were calculated. They referred to the existence of autocorrelation in the disturbances when the levels of net income and EPS were regressed on the appropriate indexes. They divided firms into two groups. The first group consisted of firms whose earnings increased in relation to the average corporate earnings and the second group consisted of firms whose earnings decreased in relation to the average corporate earnings. The study found that before the announcement of earnings, stocks in the first group earned positive abnormal returns whereas stocks in the second group earned negative abnormal returns. Brown and Kennelly (1972) examined the informational content of quarterly earnings. The study found that the information contained in quarterly EPS reports is useful in that it can be used to predict aggregate abnormal rates of return on the securities to which the EPS numbers relate. Secondly, the disaggregation of annual EPS into its quarterly components improves the predictive ability of the EPS series by at least 30 to 40 percent. Basu (1975) examined the market's reaction in the months following the announcement of annual income reports to securities trading.
at different multiples of earnings. The return residual methodology was used in the study. A total of 753 firms satisfied the sample requirements which represented a total of 6985 annual earnings announcements. The results suggest that, in accordance with the price-ratio hypothesis, the market's initial response to securities trading at different multiple earnings was neither completely unbiased, nor was the corrective action necessarily timely; on average information that was implicit in P/E ratios was not "fully reflected" in security prices in as rapid a manner as postulated by the EMH. Basu (1977) examined empirically the relationship between investment performance of equity securities and their P/E ratios. While the EMH denies the possibility of earning excess return, the price ratio hypothesis asserts the P/E ratios, due to exaggerated investors’ expectations, may be indicators of future investment performance. The results reported in the study are consistent with the view that P/E ratio information was not fully reflected in security prices in a rapid manner as postulated by the semi-strong form of the EMH. Foster (1977) examined the time-series behavior of the quarterly earnings, sales and expense series of 69 firms over the 1946-74 period. A Box-Jenkins time-series methodology was adopted. Based on inspection of the cross-sectional autocorrelation function, it was concluded that each series has (a) an adjacent quarter-to-quarter component and (b) a seasonal component. The forecasting results reveal that these two components can be successfully modelled at the individual firm level. The use of various quarterly forecasting models in security price analysis is also examined. The results are consistent with the market adjusting for seasonality in quarterly earnings in interpreting each quarter's earnings change. Jaggi (1978) examined whether disclosure of management's annual earnings forecasts provides investors with additional relevant information.
for their decisions. Investors' reaction is measured in terms of changes in daily stock prices. The significance of the unexpected returns resulting from forecasts is tested under the assumption of symmetric stable distribution. Buy- and sell-short strategies have been used to calculate cross-sectional averages and cumulative residuals. The sample for the study was selected from the firms which voluntarily disclosed annual earnings forecasts published in The Wall Street Journal from 1971 to 1974 during the first four calendar months of each year. Final samples of 121 firms with 144 forecasts are used in the study. The findings of the study suggest that earnings forecasts are accompanied by price adjustments on the days surrounding the earnings disclosure date, implying that forecasts disclosure may cause investors to revise their expectations. Brown and Warner (1980) examined various methodologies which are used in event studies to measure security price performance. The study concentrated on abnormal performance measurement using monthly data. The abnormal performance of sample companies are calculated by using mean adjusted model, market adjusted model and market model. They used 100 months of data, from month -89 through month + 10. The sample consists of 250 securities. They found that a simple methodology based on the market model performs well under a wide variety of conditions. In some situations, even simpler methods which do not explicitly adjust for market wide factors or for risk perform no worse than the market model. Oppong (1980) examined the information content of annual earnings announcements. The study examined 580 annual earnings announcements of 197 firms. The date of the earnings announcement was taken as the date that the preliminary annual report was published in the Wall Street Journal. The Standard and Poor's (S&P) "500" was chosen as the market index and the corresponding weekly returns were derived
from the Daily S&P returns file. The OLS regression analysis and correlation analysis was done and the results show that majority of the annual earnings announcements of the type of firms sampled have no information content. Even if the annual earnings announcements of the firms do have information content, the residual variance information measures are not capable of capturing it. Shiller (1981) used efficient market model that is commonly used to interpret movements in corporate common stock. The price indexes asserts that real stock prices equal the present value of rationally expected or optimally forecasted future real dividends discounted by a constant real discount rate. It was found that measures of stock price volatility over the past century appear to be far too high- five to thirteen times too high- to be attributed to new information about future real dividends if uncertainty about future dividends is measured by the sample standard deviations of real dividends around their long-run exponential growth path. Dyckman et al. (1984) examined various issues in using daily-returns data to perform event studies. The effects of portfolio size, event-date uncertainty, and magnitude of abnormal performance are quantified over a range of each variable using the Brown and Warner 1980 methodology. Portfolio simulations are used to investigate the interactive effects of these variables. The results show that mean- adjusted returns model, market-adjusted returns model, and market model detect correctly the presence of abnormal performance. Event-date clustering by industry or time appears generally to reduce the ability of traditional methods to detect abnormal performance. However, the effect may be dependent on the portfolio's risk. The non-normality of individual-security daily-return residuals has little effect on the inferences drawn from the use of the t-test applied to portfolios.
Kross and Schroeder (1984) examined both the association between quarterly announcement timing (early or late) and the type of news (good or bad) reported, and the relationship between stock returns and timing around the earnings announcement date. The total sample consisted of 297 NYSE and American Stock Exchange firms. They have considered daily stock price data were available for the years 1977-80, the quarterly earnings from the third quarter of 1968 through the third quarter of 1980, the quarterly earnings announcements dates from the second quarter of 1971 through the third quarter of 1980. Totally, they observed 3,564 observations of 12 quarters for each of 297 firms. They examined the autocorrelation function of these quarterly reports. To evaluate the stock return response to earnings announcements, they used the traditional Sharpe market model. They found that earnings announcement timing was associated with abnormal stock returns around the earnings announcement date. Abnormal returns of firms that announced early (late) were significantly higher (lower) than the returns of firms that announced late (early). Patell and Wolfson (1984) used Value line earnings forecasts to represent investors' earnings expectations for ninety-six stocks. They then applied trading rules to intra-day transactions that involved buying (shorting) those stocks with positive (negative) forecast errors. Their trading rules' average returns were measured over thirty-minute holding periods during the announcement period, overnight, and over five thirty-minute periods of the next trading day. They found that the average return for the thirty-minute period beginning at the minute of the announcement was four to five times larger than those in surrounding periods. In contrast, the average return for the thirty-minute period beginning five minutes after the announcement was considerably smaller but still significant; however, returns measured over the next ten to sixty
minutes were similar to the pre-announcement level. Moreover, overnight price changes and price changes in the first thirty minutes of the next day were significantly positive. Waymire (1984) reported evidence on the extent to which abnormal returns associated with public disclosure of management earnings forecasts are related to the information about the firm's future earnings prospects. He used 479 point projections of annual earnings per share published in the Wall Street Journal during the period from July 1, 1969 to December 31, 1973. Abnormal returns are examined over the 201-day period between event days -100 and +100. The findings suggested that abnormal returns are positively associated with the unexpected component of management forecasts (i.e., forecast deviations) in terms of both sign and magnitude. Brown and Warner (1985) examined how the particular characteristics of daily stock return data affect event study methodologies. Using simulation procedures with actual daily data, the paper investigated the impact of a number of potential problems. These include (1) non-normality of returns and excess returns, (2) bias in OLS estimates of market model parameters in the presence of non-synchronous trading, and (3) estimation of the variance to be used in hypothesis tests concerning the mean excess return, and specifically the issues of autocorrelation in daily excess returns and of variance increases on the days around an event. The results from simulations with daily data generally reinforce the conclusions of the previous work (Brown and Warner 1980) with monthly data: methodologies based on the OLS market model and using standard parametric tests are well-specified under a variety of conditions. Jennings and Starks (1985) investigated the speed of adjustment of releases of information which had different degrees of information content. They employed Patell and Wolfson methodology to study the relative information content in quarterly
earnings announcements. They examined two separate periods. The first time period extended from June, 15, 1981 to August, 21, 1981 which represented a period of poor market performance. The second time period interval was from 4 October 1982 to 31 December 1982, a period relatively stronger market performance and high trading volumes. The study found differential stock price adjustment processes associated with different levels of informativeness contained in quarterly earnings announcements. Those announcements which were classified as having high information content were associated with price adjustments processes which anticipated the official release of the news, whereas those classified as having low informativeness content news exhibit much less evidence of anticipatory price movements. The response to high content announcements appeared to have lasted for a longer period of time than did the responses to low content events. Jennings and Starks (1986) used a sample of stocks in which half had exchange-listed options traded on them while the other half did not. Their results indicated that these two types of stocks also displayed different adjustment processes to quarterly earnings announcements. That is, non-optioned stocks required substantially more time for their prices to adjust. While the major implication was that options markets appeared to expedite price adjustments, they did not discriminate among the stocks on the basis of their earnings informational content. Woodruff and Senchack (1988) studied the speed and path of adjustment in stocks to the degree of earnings surprise in their quarterly announcements by using price-volume transactions data. A differential price-adjustment process was observed, with stocks having large, positive earnings surprises experiencing a faster adjustment compared with those stocks with negative earnings surprises. Volume, transaction frequency, and size were found to be directly related to the absolute degree of
surprise, but very favorable earnings-surprises stocks experienced initially a large number of smaller trades while stocks with large unfavorable earnings surprises had relatively fewer transactions but higher volume per trade. Bernard and Thomas (1989) examined the discrimination between competing explanations of post-earnings announcement drift. The sample includes 84,792 firm-quarters of data for NYSE/AMEX firms for 1974-86. Sharpe-Lintner-Mossin CAPM model was used in the study. They found that competing explanation for post-earnings announcement drift fall in two categories. One class of explanation suggests that, at least, a portion of the price response to new information is delayed. The delay might occur because traders would fail to assimilate available information. A second class of explanation suggests that because of the capital asset pricing model used to calculate abnormal return is either incomplete or misestimated; researcher fails to adjust raw returns fully for risk. As a result, abnormal returns are nothing more than a fair compensation for bearing risk that is priced but not captured by the CAPM estimated by researchers. Cornell and Landsman (1989) examining the impact on stock prices of quarter ahead and year ahead forecast revisions, as well as forecast errors. Mean monthly available forecast for the period September, 1984 through September, 1986, quarterly earnings and earnings announcement dates for the same period for each earnings announcement, daily security prices return data and monthly security return data were collected for the study. In total a sample of 330 firms were selected with a total observation of 2,777 firm’s announcements. They used Brown and Warner methodology for the forecast analysis. Results indicated that analysts’ forecast revisions provide significant incremental explanatory power in a pooled time-series; cross-sectional regression of abnormal returns on forecast errors and analyst forecast revisions. In addition, the fourth
quarter announcement appears to provide more information to analysts and investors than interim announcements. Lev (1989) assessed the usefulness of earnings to investors, based on the available returns/earnings research evidence, and to use this assessment for a re-examination of the accounting research agenda in this area. The ratios provide more useful information to investors than the raw earnings data. To examine this ratio issue, regressed residual returns (January-December) on annual changes in various profitability ratios. The results show that the returns/earnings research evidence suggests that while earnings appear to be used by investors, the extent of earnings’ usefulness is rather limited. This is indicated by the weak and intertemporally unstable contemporaneous correlation between stock returns and earnings and by the very modest contribution of earnings to the prediction of stock prices and returns. The weak returns/earnings correlation was because of the low information content (quality) of currently reported earnings and other financial variables.

Bernard and Thomas (1990) investigated the possibility of the stock prices failure to reflect fully the implications of current earnings for future earnings. The sample was obtained from firms listed on the 1987 edition of the daily CRSP file and also listed on any edition of the COMPUSTAT quarterly files from 1982 to 1987. Based on earnings data beginning in 1970, they obtained estimates of unexpected earnings for 96,087 announcements over the period 1974-1986 for 2,649 firms. Abnormal returns data were available for up to 85,753 announcements, depending upon the return interval used. By using regression analysis they found that stock prices fail to reflect fully the implications of current earnings for future earnings. Specifically, the three-day price reactions to announcements of earnings for quarters $t + 1$ through $t + 4$ are predictable, based
on earnings of quarter t. Surprisingly, the signs and magnitudes of the three-day reactions are related to the autocorrelation structure of earnings, as if stock prices fail to reflect the extent to which each firm’s earnings series differs from a seasonal random walk. Obaidullah (1990) examined market reaction to half yearly earnings announcement by companies and concluded that semi-strong form of EMH could not be accepted for Indian stock market. Ball and Kothari (1991) examined risk, return and abnormal return behaviour in the days around quarterly earnings announcements. They tested several hypotheses concerning the effect on security prices of earnings announcements. The sample was selected from all NYSE-AMEX firms on both the COMPUSTAT quarterly tape in any quarter q from the first quarter of 1980 to the first quarter of 1988 and the Center for Research in Security Prices (CRSP) daily returns tape. The 51,178 selected firm-quarters satisfy the data requirements. The event study methodology was adopted and the Capital Asset Pricing Model was estimated. The results show that abnormal returns remain after controlling for risk increases at earnings announcements. The abnormal returns are not related to any over- or under-reaction by the market to earnings news. Cready and Mynatt (1991) examined and interpreted the security market response around annual report release dates. In this study, price response to the annual report is measured using both absolute value and squared unexpected returns. A market model approach was used to estimate the unexpected returns. Unexpected volume and unexpected number of transactions, both in general and for size-stratified trading, are estimated via market model regression. Unexpected mean transaction sizes are estimated from a temporal drift regression. This trading response suggests that investors find annual reports informative. The simultaneous absence of an economically significant price response is interpreted as indicating
that annual reports provide social welfare value. Most notably, the analysis of trading response stratified by transaction size suggests that the trading response occurs mostly within the smallest size strata. Stickel (1991) examined common stock returns surrounding earnings forecast revisions, using a large database of individual analyst forecasts, and provided new evidence on market expectations of revisions on cross-sectional differences in price effects and on the influence of confounding events. Individual analyst forecasts of annual earnings per share (EPS) for the sample firms are collected for the fiscal year ending 1980-1985. The results show that earnings forecast revision affect stock prices and this price effect is a function of magnitude of the revision. The prices are slow assimilating the information. These results cannot be explained by changes in beta risk or by an association between forecast revisions and the post-earnings-announcement drift. The abnormal returns following revisions continue to drift in the direction of the revision for about six months. Ball (1994) pointed out that EMH model is limited in use in empirical research. He states that in identical world, where all investors assume that possession of information is very costly affair and in the real world it is not possible to expect all investors being fully informed about all information. Therefore, any test of efficiency has to assume an equilibrium model. Bamber and Cheon (1995) investigated the frequency with which earnings announcements generate differential price and volume reactions, and then assesses whether these differential reactions are associated with announcement-specific characteristics. The study examines market reactions to earnings for fiscal quarters between 1986 and 1988, inclusive, which are announced between 1986 and 1989. The final sample of 8,180 quarterly earnings announcements by 1,079 firms are used in the study. The event study methodology was employed for the analysis. The results
show that, although there is a positive relation between the magnitude of price and volume reactions (on average), nearly a quarter of the announcements generate price and volume reactions of very different relative magnitudes. Additional empirical evidence is consistent with the notion that trading volume is likely to be high relative to price reaction when an earnings announcement generates differential belief revisions among investors but a small average aggregate market belief revision. Belgaumi (1995) studied the speed of adjustments of stock prices to half-yearly earnings announcements by examining the efficiency of Indian stock markets especially in the light of the reforms that were taken in the stock markets and the establishment of SEBI in 1988. He concluded that learning lags were existed in the Indian stock market and imbibing of publicly available information was slow. Therefore, it was concluded that the semi-strong form of EMH was not prevailed in the Indian stock market. Francis et al. (1996) compared the market reactions to earnings announcements during non-trading hours with the reactions to earnings announcements during trading hours. The final sample includes 150 before open announcements, 129 after close announcements and 279 matched day time earnings announcements. The study found that the opening prices are uninformative. The failure to found the opening reaction does not constitute definitive evidences of a delayed market response. Lonie and Abeyratna (1996) investigated whether UK dividend announcements contain information which is additional to, or confirmatory of, earnings information, especially when the earnings information contains an element of “surprise” for investors. Conventional event-study methodology used to examine the stock market reaction to the firm-specific event of a dividend announcement during the period 1 January to 30 June 1991. The daily share return data are used to detect the presence or absence of
abnormal share performance in an event window surrounding the dividend announcement day. This study examines dividend announcements from 620 companies, of the total sample, 354 companies increased their dividend, and 114 companies cut their dividend while the remaining 152 companies paid the same dividend in 1990 and 1991. The study found that the abnormal returns over the two-day announcement period for the different dividend-earnings combinations of companies were of the order of magnitude predicted by the dividend-signalling literature: the good-news companies earned large positive abnormal returns, while the bad-news companies had the largest negative abnormal returns of all the groups considered; the abnormal returns of the other main categories were ranked in the expected order with the exception of the relatively small group of companies whose announcement of no-change in dividend was associated with positive abnormal returns. The results of the interaction tests were significant, indicating that both signals jointly influenced the level of abnormal returns earned by the companies in the sample.

Muradoglu and Metin (1996) tested the semi strong form of the EMH in Turkey by using unit roots and cointegration tests. The data set consists of monthly observations for the period 1986:1-1993:12; all the observations are as of the end of period. The long run relationship between stock prices and inflation is investigated by assuming the possible existence of a proxy effect. Orosel (1996) investigates stock return reaction associated with earnings announcements on the ISE to verify whether these announcements possess informational value. The event study is conducted on an equally weighted portfolio of 92 securities which made more than 600 earnings announcements over the period from June 1992 to June 1995. The empirical results do indicate that the mean squared excess return on the
announcement day is significantly larger than the average during the non-event period. The full sample is also divided into “good” and “bad” news subsamples which included 347 and 256 events respectively. The results revealed that the average abnormal returns on announcements day are significantly different than zero for each subsample. These findings are consistent with the prediction that earnings announcements possess informational value. However, the behavior of the cumulative average abnormal returns do not support the hypotheses that the security prices come to new equilibrium levels after the announcement of earnings.

Pilotte and Manucl (1996) examined firms that split their stock at least twice during 1970-1988. They focused on firms with multiple splits to provide evidence on the market’s USC of previous split experience in interpreting a recurring event. The market model was estimated over the 115 trading days beginning six trading days after the first Wall Street Journal announcement of the split. The study found that stock price responses to both stock splits and post-split earnings changes depend on earnings realizations observed after previous splits. These findings support the conclusion that the market uses previous split experience to interpret a recurring event. Chaturvedi (2000) studied the behavior of returns both before and after the announcements of half yearly earnings. The study found the abnormal returns during the pre and post earnings announcement periods. Chaturvedi (2001) examined the informational efficiency over the Indian stock market and studied the behavior of stock prices around the announcement of half-yearly financial results with anomalies based on P/E ratio. He concluded that low P/E stocks outperform the high P/E stocks and provided evidence for the market inefficiency. Busse and Green (2002) examined the intraday broadcast of analyst opinions on the cable television financial news provider CNBC. The sample consists of 322 stock reports.
over 84 different trading days. They found that the prices of stocks discussed positively during the midday call report on CNBC experience a statistically and economically significant increase beginning seconds after the stock is initially mentioned and lasting approximately one minute. The response to negative reports is larger but more gradual. Prices continued falling for 15 minutes after airing, possibly due to the higher costs of short selling. They also found less evidence of a price response for stocks discussed positively during the morning call, which suggests that the information is either not highly relevant or is already known by the market. Hirschey and Richardson (2002) analyzed the information content of accounting goodwill numbers. This study focused on discretionary announcements taken by companies during the 1992–1996. Event dates for goodwill write-off announcements are identified from the Wall Street Journal Index on-line (WSJI). The final sample consist of 80 goodwill write-off announcements broadly distributed across 32 different Standard Industrial Classification (SIC) code two-digit industry groups. They found that information effects narrowly tied to goodwill write-off announcements are typically negative and material. In the one year pre-announcement period, negative information effects on the order of 40%. Post-announcement period information effects of 11% suggest that the negative information effects tied to goodwill write-off announcements are realized by the end of the announcement period. Thomas (2002) examines the relation between corporate diversification and asymmetric information proxies derived from analysts’ forecasts and abnormal returns associated with earnings announcements. The forecast data and actual earnings data are used for fiscal years ending from July 1985 to June 1996, a total of 12,282 observations are used after all preliminary screening. The study found that diversified firms do not exhibit higher
levels of asymmetric information than focused firms. This relation holds over time and after controlling for other factors expected to affect asymmetric information. These results suggest that while transparency is a concern for some conglomerates, it is by no means a general problem. Dongwei (2003) examined the stock price reactions to changes in earnings per share (EPS) in the Chinese stock markets. To examine the abnormal stock returns, he choose earnings announcement day as predictable event day. The whole sample was divided into two groups based on the outcome of the event. An announcement belongs to group I if the outcome of the event is “positive” (actual EPS exceeds last EPS). It belongs to group II if the outcome of the event is “non-positive” (actual EPS is equal to or less than last EPS). The study found that domestic A-share investors do not correctly anticipate the changes in earnings and fail to adjust new earnings information quickly, but international B-share investors can predict earnings changes better than A-share investors. As a result, abnormal returns (ARs) can be obtained by trading on the earnings information, but for A shares only. An explanation is that most A-share holders are individuals with short-term investment horizon while most B-share holders are large institutions that trade on more detailed and accurate financial information not immediately available to A-share holders. Mallikarjunappa (2004) examined price reactions to the quarterly information. He used 30 Sensex companies listed in BSE. To analyse the stock price response, he used June 2004 quarterly earnings as an event. The study found the delay in price response and therefore, concluded that the Indian market is not efficient in the semi-strong form.

DuCharme et al. (2004) studied the relations among earnings management, abnormal accruals, stock offers, post-offer stock returns, and shareholder lawsuits using a very large sample of offers made during the period from 1988 through
1997. The total sample comprises 10,232 offers, 314 of which involved lawsuits. They found that firm earnings reported around stock offers contain positive abnormal working capital accrual components, on average, and that post-offer stock returns are significantly negatively related to the abnormal accruals. Moreover, abnormal working capital accruals tend to decline after stock offers. This decline is significantly more pronounced for firms that are later sued regarding their offers than for those that are not sued. In addition, abnormal working capital accruals around stock offers are negatively related to post-offer stock returns and significantly positively related to the incidence of these lawsuits. Furthermore, they are significantly positively related to the lawsuit settlement amounts.

Gao and Tse (2004) investigated the trading activities of two distinct classes of shareholders, namely, the Chinese domestic investors and the foreign investors in the segmented Chinese A- and B-share markets, respectively. They used an event study on the annual earnings announcements based on two different accounting standards: International accounting standards (IAS) and PRC generally accepted accounting principles (PRC GAAP). The results shows that the investors in the B-share market react to both the IAS and PRC GAAP earnings announcements, while the investors in the A-share market pay more attention to the PRC GAAP earnings reports. In the B-share market, positive abnormal returns are associated with positive earnings surprise and negative abnormal returns go with negative earnings surprise. They also observed that the abnormal trading volumes without significant price changes for the ‘A’ shares, which may be due to existing information in the A-share market prior to earnings announcements. The post event abnormal trading volumes last for a longer period in the A-share market than in the B-share market. Mendenhall (2004) examined whether the magnitude
of post-earnings-announcement drift is related to the risk faced by arbitrageurs, who may view the anomaly as a trading opportunity. The sample consists of all firm-quarter observations for which complete data are available. The primary sample consists of 52,575 firms quarter observations between the second quarter of 1991 through the first quarter of 2000. The study begins in the second quarter of 1991 due to the availability of institutional holding data. Through regression analysis, the results supported the view of post-earnings-announcement drift as an under reaction to earnings information. Stuerke (2005) examined whether both the value relevance of accounting information and the quality of earnings affect financial analysts’ revisions of forecast annual earnings per share soon after an earnings release. Using publicly available data, regression analysis explored the influence of earnings response coefficients (ERCs), unexpected earnings, and interactions between ERCs, the association between earnings and returns, and unexpected earnings on forecast revisions after earnings announcements. The empirical tests demonstrated a positive relation between the percentage of analysts revising forecasts soon after interim earnings announcements and firm-specific ERCs, the interaction between the magnitude of earnings surprises, ERCs, and earnings-returns associations, and pre-announcement dispersion in forecasts. The results suggest that usefulness of earnings releases is related to the magnitude of new information in the release, the persistence of earnings innovations, the firm-specific mapping between earnings and returns, and prior uncertainty about earnings. Chordia and Shivakumar (2006) examined whether earnings momentum and price momentum are related. Both in time series as well as in cross-sectional asset pricing tests are used. To study the impact of earnings momentum on price momentum, they first create earnings portfolios that capture the post-earnings
announcement drift phenomenon. For each month, they sort all NYSE-AMEX firms on the monthly Center for Research in Security Prices (CRSP) files with data on COMPUSTAT into deciles based on their SUE from the most recent earnings announcement. The study found that the price momentum is captured by the systematic component of earnings momentum. The predictive power of past returns is subsumed by a zero-investment portfolio that is long on stocks with high earnings surprises and short on stocks with low earnings surprises. Further, returns to the earnings-based zero-investment portfolio are significantly related to future macroeconomic activities, including growth in GDP, industrial production, consumption, labor income, inflation, and T-bill returns. Forbes (2006) investigated the usefulness of analysts’ earnings forecast revisions in the allocation of funds to different industries and countries. They used first call analysts’ earnings forecasts for companies listed on the main European stock markets over the period January 1987 to December 2001. It was found that a significant post revision announcement effect for individual companies. However, the abnormal returns evaporate away as the research moves from an individual company level to an industry or country level. The paper provides two kinds of evidence which seem to cast doubt on the analysts’ ability to fully incorporate industry and country specific information into their forecasts: returns are driven more by common components than earnings forecast revisions, and company specific news reflected by the revision signal dominates industry or country news. Gupta (2006) investigated the stock market reaction associated with earning announcements in the Indian stock market and the informational value of these announcements. An event study was conducted on the 50 companies, comprising the CNX Nifty Index, which made earning announcements in March 2006. He concluded that in case of full sample,
an insignificant Average Abnormal Return (AAR) on the announcement day was found. The results of the sub-sample indicate that the market was reacted sharply to a decline in the earnings on the announcement day. So it was concluded that the earning announcements contained important information which caused stock prices to change. Jegadeesh and Livnat (2006) investigated the role of sales (or revenue) surprises in predicting differential drift levels. The daily returns were taken from the Center for Research in Security Prices (CRSP) dataset from one day after quarter t’s earnings announcement through the announcement date of earnings for quarter t + 1. Data were available to assign the company to one of the six Fama-French portfolios based on size and book value to market value. The final sample size consist of, 557 companies. The study found that the magnitude of the observed drift in security returns after the announcement of earnings depends on the contemporaneous magnitude of the revenue (or sales) surprise. When the two signals confirm each other, the magnitude of the drift is larger, quite likely because revenue surprises identify companies for which earnings surprises should have a more persistent effect on future earnings growth. Kakani and Ghalke (2006) studied the relationship between the parliament sessions and the stock market. Considered both the market indices (i.e., BSE Sensex and NSE Nifty) to test the parliament session effect. The data for the indices has been considered since 1st June 1991 to 15th October 2005. The data on the parliament session was obtained from the statistical handbook published by the Ministry of Parliamentary Affairs, Government of India. Using past 14 years stock market data, it was found that stock index returns are significantly lower and volatility is higher when parliament is in-session as compared to parliament in-recess. Kothari et al. (2006) studied the stock market’s reaction to aggregate earnings news. The main earnings sample
includes all NYSE, Amex, and NASDAQ stocks on the Compustat quarterly file from 1970 to 2000. The average number of stocks per quarter was 3288, compared with an average of about six thousand firms on the Center for Research in Security Prices (CRSP) and Compustat databases for the same period. The sample represents about 90% of total market value. The autocorrelation and regression analysis was used for the analysis. They found a substantially different pattern in aggregate data. First, returns are unrelated to past earnings, suggesting that prices neither underreact nor overreact to aggregate earnings news. Second, aggregate returns correlate negatively with concurrent earnings; over the last 30 years. The stock prices increased 5.7% in quarters with negative earnings growth and only 2.1% otherwise. This finding suggests that earnings and discount rates move together over time and provides new evidence that discount-rate shocks explain a significant fraction of aggregate stock returns.

Lyroudi et al. (2006) investigated whether a stock split is still considered a policy that creates value for the company and the rationale behind such action for companies listed on the NASDAQ. The sample consists of 57 observations and the examination period was also limited to 1999 and 2000. The event study methodology was employed to examine the announcement effect of stock splits on stock prices. The results indicated a positive market reaction at the stock split announcement and that the liquidity hypothesis explains the rationale for the stock splits. DeFond et al. (2007) examined cross-country differences in the information content of annual earnings announcements using short-window methodology. The sample period covers 1995 through 2002, with reported earnings and earnings announcement dates. Using data from over 50,000 annual earnings announcements in 26 countries, they found that annual earnings announcements
are more informative in countries with higher quality earnings or better enforced insider trading laws, and that annual earnings announcements are less informative in countries with more frequent interim financial reporting. They also found that, on average, earnings announcements are more informative in countries with strong investor protection institutions. Iqbal and Mallikarjunappa (2007) examined stock market reaction to earnings information by taking September 2001 quarter earnings announcement as an event. The sample consists of 149 companies listed in BSE Limited. The sample is subdivided into, good news, bad news and overall portfolios. They have used event study methodology to test the semi-strong form of EMH. They have used t-test, Runs test and sign test for the statistical significance. The behavior of AARs and CAARs are examined for 61 days event window. The results revealed that market reaction is slow and provides an opportunity to earn abnormal returns. Iqbal et al. (2007) examined stock price reactions to quarterly earnings announcements. The study used 150 BSE-200 index based companies as sample. The abnormal performance was measured by using market model. The event study methodology was employed to see the stock performance in the event window. They found that market is semi-strong form inefficient. They observed significant CAAR values during the event window which is an indicator of delayed price response. Iqbal & Mallikarjunappa (2008a) examined quarterly earnings information, stock returns, and stock market efficiency in India stock market by taking quarterly earnings announcement as an event. The study is based BSE-200 index based companies having minimum 20 percent foreign holdings. The companies are divided into, good news, bad news and overall portfolios. They have used event study methodology. For the statistical significance of AARs and CAARS, t test, Runs test and sign test are used. It was found that CAAR values are
statistically significant and investors can generate excess return if they hold the shares for certain period of time. Iqbal and Mallikarjunappa (2008b) examined semi-strong form of EMH by taking December 2005 quarter earnings announcement as an event. The study is based on 146 companies having minimum 20 percent foreign holdings. They have used both raw returns and log returns. The behaviour of AARs and CAARs are examined for 30 days before and 30 days after the announcement of quarterly earnings. The results of the study revealed that Indian stock market is semi-strong form inefficient. Laidroo (2008) determined to what extent economically significant stock return and volume changes on Tallinn, Riga and Vilnius Stock Exchanges (TSE, RSE, VSE) are contributable to public announcements disclosures and which types of announcements drive these. Event-study methodology was used to determine economically significant return and volume events. It was found that 22-37% of return or volume events explained by public announcements was twice lower than that reported in the UK. The greatest frequency of disclosures was attributable to financial disclosures as could be expected. The magnitude of reactions on VSE was greater than reported on TSE and RSE, which indicates that VSE differs from TSE and RSE in its information processing. Lakhal (2008) examined whether non-mandated earnings disclosures include value-relevant information and affect information asymmetry and stock market liquidity. The event study methodology explored the informational content of good, bad and neutral voluntary earnings disclosures. The OLS panel regression framework was also used to analyze information asymmetry and stock market liquidity subsequent to both categories of voluntary earnings disclosures i.e. earnings forecasts and quarterly earnings disclosures. Empirical tests showed that voluntary earnings disclosures include material information and that bad news is
released in an untimely fashion leading to information leakage in the pre-announcement period. The results also indicate that quarterly earnings enhance stock market liquidity by shrinking bid-ask spreads. However, earnings forecasts exacerbate information asymmetry before and after the announcement date. This result confirms the existence of information leakage and suggests that managers have considerable discretion whether to make a forecast, and in deciding its timing, form, and specificity. Sponholtz (2008) examined the reaction to earnings announcements in a small stock market. The traditional event study method was used to examine the information content of annual earnings announcements in the small Danish stock market from 1999-2004. The study found abnormal volatility in the days surrounding the announcements, indicating that they contain relevant information for the stock market. The abnormal volatility persists several days after the announcement, suggesting that the information environment of this small stock market works to decrease the speed of adjustment. The paper also found significant positive abnormal returns accompanying the announcements. There was a positive correlation between the information content and pre-disclosure information.

Cajueiro et al. (2009) assessed if the financial market liberalization introduced in the beginning of the 1990s in Greece has changed the degree of market development (efficiency) by studying time-varying global Hurst exponents. This study used the daily closing prices for the general index of the Athens stock exchange from 01/02/1987 to 04/26/2005, for a total of 4563 observations. The results suggested that changes in financial market liberalization have important positive implications on the degree of development of stock markets. These results have important policy implications for the development of stock markets around
the world. Dasilas et al. (2009) investigated the impact of dividend initiations on shareholders’ wealth using a sample of 38 Greek listed firms. The event study methodology of Brown and Warner (1980) was employed to examine the share price reaction to initial dividend announcements across different information environments. Results show that dividend initiations bring about significant positive abnormal returns during the announcement period. The price response to dividend initiations is inversely associated with the information environment. Finally, the volatility of stock returns is higher in the low information environment group of firms than in the high information environment group of firms. Harjoto et al. (2009) investigated the size effect of market reaction to unexpected earnings based on whispers or unofficial individual earnings forecasts. Using both univariate and multiple regression analysis, this study attempts to demonstrate that there is a size effect in the market reaction to unexpected earnings based on whispers. The empirical results are based on 13,795 quarterly earnings whispers over 1997-2006. The results showed that for both abnormal returns (ARs) and trading volume, the market reaction for big firms is less compared to that of small firms. Given that, information for small firms is less available and transparent than for big firms; this study provided useful evidence that whispers play a larger role in equity pricing for small firms. Laopodis (2009) examined the extent to which fiscal policy actions affect the stock market’s behavior for the US during 1968–2005. The monthly observations on the federal budget deficit, the seasonally adjusted consumer price index (1984 = 100), the seasonally adjusted money supply, the stock market index (proxied by the S&P500 index), the 3-month Treasury Bill, the 10-year Treasury note rates, the AAA-corporate bond yield, industrial production index (1984 = 100) and the effective federal funds rate for the 1968:1 to 2005:12...
period are used. They applied the ADF test and PP test for unit-root testing and correlation methodologies for the analysis. The findings are consistent with the hypothesis that past budget deficits negatively affect current stock returns, suggesting that the market is inefficient with respect to information about future fiscal policy actions. Raja et al. (2009) examined the informational efficiency of the Indian stock market in the semi-strong form of EMH and covered seven financial years ranging from 2000-01 to 2006-07. They concluded that the Indian stock market was efficient but not perfectly efficient to the announcements of stock splits and this information could be used by investors for making abnormal returns at any point of the announcement period. Sharma and Chander (2009) examined the impact of earnings announcement over the daily return series of the stocks listed over the Indian capital markets. The date of board meeting for these earnings announcements have been considered as the announcement dates. The present study has considered quarterly earnings announcements made in the month of April for all empirical investigations. The final sample of these 133 stocks was used to draw conclusion regarding the informational efficiency of the Indian stock markets. The daily observations are considered for all the sampled stocks and market proxies. The study of the observed statistical significance discerned in the CAAR series during the bull phase indicate that by holding the stocks for some days around the event day may result into some significant abnormal returns to the investors. Ho et al. (2010) examined the relation between audit tenure and how clients manage the annual earnings surprise. A sample of 5,029 firm-year observations from 1996 to 2003 were employed to examine whether audit tenure is negatively related to the incidence of accrual based-upward earnings management to avoid negative earnings surprises; and whether audit tenure is positively related
to the incidence of downward forecast guidance to avoid negative earnings surprises. Empirical results indicated a substitution of downward forecast guidance for upward earnings management as audit tenure lengthens. The paper provided evidence that, as the auditor-client relationship lengthens over time, firms turn to downward forecast guidance as a substitute for upward earnings management. This study supported the notion that audit tenure affects firms’ choices among various tactics in their attempts to avoid negative earnings surprises. Elshafie et al. (2010) examined the association between investor perception management through reporting aggressive pro forma (PF) earnings and earnings management through real activities or by manipulating accruals. A sample of PF earnings announcements over 2001-2007 was manually collected from Lexis Nexis, consisting of 4,285 firm-quarter observations; the aggressiveness of PF earnings reporting was measured by the difference between GAAP earnings and PF earnings. The paper found that managers report more aggressively calculated PF earnings numbers if they do not meet their earnings targets or they have limited abilities to manage earnings. Also it was found that the gap between the value relevance of GAAP earnings and PF earnings is smaller for firms with relatively low level of discretionary accruals; this gap is decreased in the post-Sarbanes Oxley Act period. This study provided the evidence that the opportunistic reporting of PF earnings is associated with managerial inability to meet earnings targets through earnings management. He et al. (2010) examined whether Japanese private placement issuers manipulate their earnings around the time of issuance and the relationship between earnings management and the post-issue stock underperformance. Cross-sectional modified Jones model was used to measure earnings management proxy – discretionary accruals. Control firms are developed
to mitigate the impact of other factors on the measurement of earnings management. Different set of control firms is also developed to calculate abnormal stock returns. It was found that managers of Japanese private placement issuers tend to engage in income-increasing earnings management around the time of the issuance. It is further speculated that earnings management serves as a likely source of investor over optimism at the time of private placements. To support this speculation, evidences found suggesting that the income-increasing accounting accruals made at the time of private placements predict the post-issue long-term stock underperformance. Iqbal and Mallikarjunappa (2010) used event study methodology, t test, Runs test and sign test to examine the stock price behavior of Indian stock market. The results shows delayed stock price response and it contradicts semi-strong form of EMH. Kwag and Stephens (2010) investigated whether earnings management that surpasses a threshold is associated with market mispricing. The paper examined the level of discretionary current accruals (DCA) as a proxy for earnings quality. Operationally the threshold of earnings management is defined as the mean DCA, and it is assumed that highly managed firms (both income-decreasing and income increasing) produce low-quality earnings information. It is postulated that such management may lead to mispricing errors by investors who make incorrect adjustments for lower earnings quality. The evidence suggested that investors possess idiosyncratic perceptions toward earnings management. Investors of income-decreasing firms tend to under-adjust for analyst optimism, while investors of income-increasing firms are inclined to over-adjust for analyst optimism. In addition, investors of both types of highly managed firms appear to under-adjust for earnings management. These investor characteristics result in a post-earnings announcement upward drift of cumulative
abnormal returns (CARs) for income-decreasing firms and a downward drift for income-increasing firms. The findings strongly indicate that there is a significant mispricing at the earnings announcement date for the income-decreasing and income-increasing portfolios and the mispricing persists in the short run. Thus, it may be possible for investors to exploit the mispricing by holding a long position.

Li (2010) investigated whether firm specific factors influence management’s preferences for an earnings threshold. The Logit models are estimated to explore the relationships between firm-characteristics and management’s perceptions of the relative importance of each threshold. The study found that large firms, firms with high growth prospects and firms with high trading volume are more concerned with avoiding negative earnings surprises, while small firms, firms with low growth prospects and firms with low trading volume are more prone to avoid earnings declines and losses; for firms with high analyst forecast accuracy, avoiding negative earnings surprises is more important than avoiding earnings declines and losses; and firms with low analyst forecast dispersion focus more on avoiding negative earnings surprises and losses, while firms with high analyst forecast dispersion focus more on avoiding earnings declines. Overall, this study showed that firm characteristics do affect management’s perceptions of the relative importance of each threshold.

Papanastasopoulos et al. (2010) examined the informational content of retained and distributed earnings for future profitability and stock returns. The study utilized firm-level cross-sectional persistent regressions, Mishkin’s econometric framework and portfolio-level analysis. The empirical tests are conducted using financial statement data from the COMPUSTAT annual database and monthly stock return data from center for research in security prices (CRSP) monthly files. The final
sample sizes of 150,896 firm-year observations with non-missing financial statement and stock return data. The evidences showed that investors act as if the components of retained earnings (current operating accruals, non-current operating accruals and retained cash flows) have similar implications for future profitability, leading to an overvaluation of their differential persistence. It also appeared that while they cannot distinguish between the distinct properties of distributed earnings, they correctly anticipate the persistence of net cash distributions to debt holders (net debt repayment) but underestimate the persistence of net cash distributions to equity holders (dividends minus net stock issues). Truong (2010) examined the profitability of trading on analyst forecast based earnings surprises during the post announcement period in the New Zealand stock market over the period 1994 to 2008. The results show that a post earnings announcement drift (PEAD) anomaly exists in the New Zealand equity market. A hedge strategy of going long the top quintile of earnings surprise stocks and short the bottom quintile of earnings surprise stocks can generate more than 6% excess return in the 60 days following the earnings announcement. He further tested the association between PEAD and several control variables and found that PEAD is increasing in earnings surprise defined relative to past earnings and the level of arbitrage risk. There is no positive relation between PEAD and revenue surprise after controlling for earnings surprise as documented in the United States. Visaltanachoti and Yang (2010) contributed to the cross-listing literature by documenting the speed of convergence to market efficiency for foreign stocks listed on the NYSE. The sample consists of 320 stocks from 39 countries for analysis. The sample period covers the year of 2005. They found that, on average, it takes 30–60 minutes for a foreign stock to achieve market efficiency. For a comparable US stock, it takes only 10–15
minutes. The significant difference between foreign and US stocks remains robust when the speed is measured by the number of transactions rather than in calendar time. After relevant firm characteristics are controlled for, the time that it takes for foreign stocks to reach efficiency is significantly negatively related to the quality of their home country institutions. They find that one possible channel through which institutions affect the speed is through their impact on information asymmetry. Hrazdil (2010) examined the information hypothesis of S&P 500 index inclusion announcements by investigating the degree to which information beyond Standard & Poor’s eight stated criteria enters the inclusion decision. The sample of S&P 500 additions and their eligible candidates during 1987-2004 are included in the study. This paper employs logistic analysis that identifies factors ex-post beyond the stated criteria that help distinguish the type of information that influences the final selection decision and that is arguably priced at the inclusion announcements. The evidence indicated that, when choosing among new S&P 500 candidates, the S&P’s committee relies primarily on publicly available information related to enterprise risk and historical performance. Material, private insight into future value-relevant information plays at most a small part in the selection. The results suggest that index additions convey limited new information about added firms. Afego (2011) examined the stock market reaction to annual earnings information releases using data on the Nigerian Stock Exchange. Using the event study method, the speed of reaction of the market to annual earnings information releases for a sample of 16 firms listed on the exchange is tested. Significant abnormal price reactions around earnings announcements suggest that the earnings announcements contain value-relevant information. He found that the magnitude of the cumulative abnormal returns is dominated by significant reactions 20 days
before the earnings release date which suggests that a portion of the market reaction may be due to private acquisition and, possibly, abuse of information by insiders. The persistent downward drift of the cumulative abnormal returns, 20 days after the announcement, is inconsistent with the EMH, and therefore suggests that the Nigerian stock market does not efficiently adjust to earnings information for the sample firms within the study period. Booth et al. (2011) investigated the causes of post-announcement drift and whether this drift is observed for various types of news announcements. Using share ownership data, the authors examined the trading behavior of foreign and domestic investors during the post-announcement periods of scheduled earnings and unscheduled non-earnings announcements. To minimize the effect of thin trading of illiquid stocks, the sample consists of 20 most frequently traded stocks. These stocks constitute over 90 percent of the total trading volume of the HEX and comprise its popular HEX index. The regression analysis is done and the results shows that the post-announcement drift exists for both types of news, but only if the news is negative. As a group, foreign investors react first by selling shares of firms reporting negative information. Domestic investors act in the opposite manner. Deshpande and Svetina (2011) investigated the value-relevance of local news, specifically earnings announcement surprises, in the context of the well-documented local bias in investors’ portfolios. Using a hand-collected panel dataset spanning 15 years of quarterly earnings announcements of publicly traded firms, abnormal stock returns engendered by earnings surprises based on local newspaper announcements are compared to those from earnings surprises based on financial analysts’ forecasts. The regressions from the univariate and multivariate analyses was done and the results show that when both sources of earnings surprise are negative, the authors
found a statistically significant differential stock price effect in a sample where local firms’ earnings announcements in the local newspaper signal positive earnings surprises; but the earnings surprise based on financial analysts’ forecasts is negative. This result remains after controlling for time- and firm-fixed effects. It was found that the stock price impact of earnings surprises is also significantly influenced by local newspaper reports of the announced quarterly earnings of local firms. Mahmoudi et al (2011) examined reaction and under-reaction of investors toward positive and negative earnings announcements in Tehran stock exchange. Daily closing prices data were obtained for all firms listed in Tehran stock exchange from 1 January 2003 till April 2010. The final sample that includes 125 earnings announcements consisting of 75 earnings increasing and others decreases. The event study methodology was used and the results show that investors react significantly to the financial statement reports. They underreact to both positive earnings announcements changes and negative earnings announcements changes. Mlonzi et al. (2011) investigated whether there are any significant abnormal returns around the public announcement of earnings and to establish whether the EMH applies to the small ALtX market. The study focused on all the companies listed on the JSE-ALtX that announced annual earnings between 1 January and 31 December 2009. The method used for calculating the expected returns was the Capital Asset Pricing Model (CAPM). Empirical evidence demonstrates that there is substantial negative share price reaction to earnings announcements on the small ALtX stock market.

Mun et al. (2011) examined the association between levels of annual report voluntary disclosure and the market reaction to the next interim earnings announcement in a market with both low regulation and analyst following. They
investigated the market reaction to fiscal 2001 semi-annual earnings announcements for 104 non-financial Singapore Exchange Main Board and SESDAQ firms for which levels of voluntary disclosure are obtained from the fiscal 2000 annual reports. The OLS regressions and correlation tests are used. The results show that pre-announcement voluntary disclosure significantly reduces the price and volume reactions in the earnings announcement period. They extend the analysis to investigate trading behavior during the earnings announcement period and conclude that voluntary disclosure in annual reports can be regarded as an important determinant of preannouncement information precision in markets with low regulation and analyst following and observe the expected trading behavior. Rufus (2011) used residual analysis methodology to investigate stock price reaction to the 2004 bank capital requirements on the Nigerian stock market. They used monthly data over the period January 1986 to December 2006. The results show that the introduction of the 2004 bank capital requirements has a positive impact on quoted securities on the Nigerian stock market. This is reflected in positive abnormal returns from the Nigerian stock market when trading is based on the information from the 2004 bank capital requirements. The results show that the Nigerian stock market is inefficient in the semi-strong form. Gupta et al. (2012) studied the stock price reaction to 65 dividend announcements (increase) by 28 companies during the period 2006-09 listed on BSE 30 Sensex. The analysis had been undertaken using event study methodology. The study exposed the fact that stock prices do react to increase in dividend announcements and dividend announcements do possess signaling property. The study also found out that Indian stock market is inefficient. Blouin (2012) investigated whether other information included with management earnings forecasts can help analysts to formulate better
earnings predictions. This study used ordinary least squares regression analysis of 373 management earnings forecasts and compares changes in analyst forecast characteristics surrounding the release of a management forecast of earnings from the same firms which sometimes include other information with their forecasts and sometimes do not. The results show that the analysts make larger forecast revisions when other information is included with a surprising management earnings forecast, especially if the forecast contains good news. This information reduces subsequent analyst forecast error for firms with negative earnings. Kamal et al. (2012) argued that changes in the information environment after the year 2000 due to the implementation of Regulation Fair Disclosure (FD), decimalization and Sarbanes Oxley Act, should result in reduced abnormal returns in the post-2000 period. They studied the additions to the S&P 500 between January 1993 and December 2007 by dividing the data into two sub-periods: namely the pre-2000 (from January 1993 to September 2000) and the post-2000 (from November 2000 to December 2007) periods. The authors compared the abnormal returns and liquidity changes around the announcement day of firm’s addition to S&P 500 in the pre- and post-2000 periods. Univariate and multivariate tests are used to control for factors that research shows affect the abnormal returns around additions to S&P 500. It was found that the reduction in informational asymmetry in the post-2000 period has resulted in a significant decrease in the abnormal return on the announcement day of additions to S&P 500 index and changes in the stock’s liquidity in the post announcement period are now marginal. Baik et al. (2013) examined the presence and performance of volatility arbitrage opportunities around earnings announcements using daily ELW (equity linked warrant) trade data in the Korean market. They found that volatilities drift in a predictable and monotonous
fashion. The predictable drift generates a volatility arbitrage opportunity. The trading strategy exploits both the pre- and the post-announcement drift of implied volatilities and generates a sizable trading profit of 11.4% per ELW contract in excess of transaction costs during the 21 business days around the earnings announcement date. The profits remain robust after considering the liquidity of ELWs and assuming very high transaction costs. The results suggest that the Korean ELW market is not a level playing field because the trading strategy was easily implementable for liquidity providers while difficult for retail investors.

Malhotra et al. (2013) examined the short-term and long-term stock price volatility changes around bonus and rights issue announcements, using historical volatility estimation and time varying volatility approaches. To capture historical volatility, change in standard deviation for 20 days and 100 days before and after announcement have been examined. The change in time varying volatility and unconditional volatility is examined using GARCH (1, 1) model. The data on the bonus and rights issue announcement has been collected through desk research from PROWESS 3 database of Centre for Monitoring India Economy (CMIE). The initial search was done for the manufacturing and service sectors companies which announced bonus and rights issues during 2000-2008. The results indicated that the historical volatility has increased after bonus and rights issue announcement. The volatility persistence and unconditional variance have increased after the bonus and rights issue announcements.
Part C

3.3 Empirical Evidences of Strong-form EMH


Jaffe (1974) investigated the information content of the publication by examining the residuals of securities subsequent to the publication in the official summary of insider trading events in the sample securities. A random sample of trading months was drawn covering 200 large firms in the period 1962-1968. Sharpe and Lintner model of equilibrium pricing of risky capital assets was used in
this study. The data suggests that insiders possess special information. The evidence with respect to the profitability of insider trading was not clear-cut. Scholes's results suggest that residuals drop on the day of the secondary distribution with no further systematic changes. Grant (1980) assessed the differences in the information content of annual earnings announcements between a sample of OTC firms and a sample of NYSE firms. This study covered the years from 1960 to 1964. The OTC and NYSE groups were selected. Total of 211 OTC firms reporting 747 annual earnings announcements and 101 NYSE firms reporting 336 announcements were included in the final sample. Markowitz and Sharpe market model was employed in this study. The results supported the conclusion that the annual earnings announcements of OTC firms appear to possess more information content than those of the NYSE firms. The OTC investors apparently have fewer alternative sources from which to acquire information on firms prior to the release of the annual earnings number. Therefore, when the announcement was made, the market reaction to the information contained in the report may be significant. Pincus (1983) investigated some characteristics of information announcements which might explain differential market response to the announcement of accounting earnings. A total of 136 firms are included in the sample. The abnormal performance of sample securities was measured by using market model. The results indicated that the differences in both duration and unexpected returns variability of stock market reactions to earnings announcements, where announcements are dichotomized by greater or lesser degrees of earnings predictability. Specifically, the results indicated that the “precision of earnings announcements” was associated with differences in the rapidity of stock market adjustment and in the variability of unexpected returns.
Carlton and Fischel (1983) analyzed critically the arguments in favor of prohibiting insider trading and to suggest allowing the practice which may be an efficient way to compensate corporate managers. It was found that no evidence suggests that firms generally have attempted to prohibit insider trading or, after 1934, attempted to plug the large gaps in the federal bans against insider trading. Firms have strong incentives to allocate property rights in valuable information to the highest-valuing user. The absence of widespread prohibitions on insider trading in employment agreements and corporate charters indicates that firms may, in some situations, want to allocate the property right to managers or other employees. Elliott et al. (1984) examined distributional characteristics of insider trading and evaluated whether these distributions are altered surrounding certain public announcements. The logit model was applied in the study. The sample includes 1250 cases of which 812 (64.96%) constitute extreme selling. The results indicated that the direction of insider trading is generally consistent with insiders' using private information in a profitable manner. Insider trading surrounding specific public information events, however, was often insignificantly different from insider trading at other times. When significant insider trading has been observed, the direction has not always been consistent with a profitable trading strategy. Therefore, they have only been able to explain a small proportion of insider trading as the result of the private use of information that was subsequently publicly disclosed. Penman (1985) investigated the information content of insider trading and compares it to that of management earnings forecasts. The management forecasts of annual earnings were collected from the Wall Street Journal for the years 1968 to 1973. Of the 2217 forecasts collected over the six-year period, 737 remained as the final sample. He used martingale with drift model and market index model for forecasting
annual earnings-per-share. The results indicated that the insider trading measures do not capture the information conveyed in earnings forecasts, although there is evidence that insider trading measures that take into account the timing of trades relative to the date of the release of the forecast are informative. King et al. (1988) considered the evidence on the scale and scope of insider trading and assessed the legal and regulatory framework for its control. They have argued that insider trading has both benefits and costs. The benefits are that information is brought to the market and revealed through the price to economic decision makers. The costs are the increase in bid-ask spreads that act as a tax on trading, and the wasted resources that are devoted to the discovery of information with a high private but a low social value. Despite legal restrictions, some trading by the companies insiders appears to earn significantly higher rates of return than are received by outsiders. The ethical objection to the profits arising from trading on inside information may be the deciding factor in erring on the side of strict controls on insider trading. Daniel et al. (1998) proposed a theory of securities market underreaction and overreactions based on two well-known psychological biases: investor overconfidence about the precision of private information; and biased self-attribution, which causes asymmetric shifts in investors’ confidence as a function of their investment outcomes. They showed that overconfidence implies negative long-lag autocorrelations, excess volatility, and, when managerial actions are correlated with stock mispricing, public-event-based return predictability. Biased self-attribution adds positive short-lag autocorrelations short-run earnings “drift,” but negative correlation between future returns and long-term past stock market and accounting performance. Jarrell and Poulsen (1989) examined market activity of 172 tender offers from 1981 to 1985, and, specifically, they studied how several
observable characteristics of the takeover bid affect pre bid runup in stock prices and the "surprise" market reaction when the market formally learns the firm unanticipated premium. Scholes-Williams methodology was employed to estimate abnormal performance of sample securities. The study found that the evidence that unanticipated premiums are lower and pre bid runup is greater when the bidder holds a relatively large position in the target at the time of the bid. They found no evidence suggesting that whether a bid is hostile or friendly affects unanticipated premiums or stock price runup. The twenty-six target firms in the sample that have been identified in government insider trading allegations show unusually low unanticipated premiums or high pre bid runup, after accounting for the other variables. The results suggest that increases in stock prices and trading volume before tender offer announcements are associated with several observable (and legal) factors. John and Mishra (1989) examined information equilibrium where the better informed corporate insiders use the level of their own trading strategically along with the corporate announcements in dealing with a less informed market. The framework used was that of an efficient signaling equilibrium with multiple signals. The Ambarish, John, and Williams methodology was employed in the study which was developed in 1987. Total sample of 65 firms are examined in this study. The study argued that trading by corporate insiders should be viewed as a plausible mechanism for conveying their private information to the market. The theory and evidence suggests that viewing insider trading as a signaling activity jointly with other corporate signals may be a useful perspective to understand insider trading around corporate announcements and the attendant price effects.
Lin and Howe (1990) examined the profitability of insider trading in firms whose securities trade in the OTC/NASDAQ market. The insider trading data of all publicly held firms from January 1975 through April 1983 were considered in the study. The sample includes 7625 intensive trading months for 1828 different firms; 1006 firms experience 3449 intensive purchase months, and 1214 firms have 4176 intensive sales months. Two market-adjusted metrics of abnormal returns are used in the study. The evidence suggests that timing and forecasting ability on the part of insiders, high transaction costs (especially bid-ask spreads) appear to eliminate the potential for positive abnormal returns from active trading. By implication, outside investors who mimic the trading of insiders are also precluded from earning abnormal profits. In addition, they provided evidence on the determinants of insiders' profits. The data suggests that insiders closer to the firm trade on more valuable information than insiders removed from the firm. Lang (1991) examined the stock price response to quarterly earnings announcements for 200 firms over 12 quarters following their initial public offering dates. To test for changes in the stock price response to earnings over time is the earnings response coefficient, the coefficient from a regression of abnormal returns on unexpected earnings. The results of the tests are consistent with the prediction that the earnings response coefficients decrease over time, approaching a constant level. Evidence from an analysis of alternate explanations for the observed pattern suggests that the results are not driven by other factors which have been shown to influence earnings response coefficients. Teets (1992) examined whether regulation explains cross-sectional differences in the earnings response coefficients (ERCs) relating unexpected earnings to abnormal stock returns by comparing the ERCs of electric utilities with those of a random sample of non-regulated firms. The random sample
of non-regulated firms was drawn from a sample of 233 firms. Daily returns covering the 1,432 trading days from January 2, 1975 to August 29, 1980 were used in the estimations. He found that the ERCs are smaller on average for the electric utilities than for the non-regulated firms, consistent with the view that regulators buffer the firms they regulate from changes in the operating environment. The average of the utility coefficients is significantly less than that of the random sample's average, consistent with the view that cash flow changes associated with unexpected earnings are less permanent for utilities than for non-regulated firms. Seyhun (1992) examined the effects of increases in the level and enforcement of insider-trading regulations in the 1980s on corporate insiders. The data used in this study come from the national archives. The data include all insider transactions in publicly held firms between January 1975 and December 1989. This study only examined insiders' open market sales and purchases since open-market sales and purchases are more likely to be due to special information. The sample contains a total of 19,571 firms. This study used the market model to measure the expected returns of the sample securities. The securities reactions are examined through event study methodology. The results show the increase in the volume of insider-trading activity over time. On average, the number of shares traded by insiders increased by four times from the pre-1980 to the post-1984 sub-period. It also shows that court cases regarding insider trading around the time of earnings and takeover announcements did affect insider trading patterns. Meulbroek (1992) investigated the mechanism by which inside information becomes incorporated into the stock price. The sample consists of individuals charged with insider trading by the Securities and Exchange Commission in civil or administrative cases during 1980-1989. He used event study methodology to
analyze abnormal returns on insider trading days and on the day the inside information becomes public. Using previously unexplored data on illegal insider trading from the Securities and Exchange Commission, this paper found that the stock market detects the possibility of informed trading and impounds this information into the stock price. Specifically, the abnormal return on an insider trading day averages 3%, and almost half of the pre-announcement stock price run-up observed before takeovers occurs on insider trading days. Both the amount traded by the insider and additional trade-specific characteristics lead to the market's recognition of the informed trading. The conclusion that price run-ups prior to takeover announcements reflect insider trading, however, was contingent on the untested assumption that insider trading affects stock prices. Reichman (1993) analyzed the securities industry and its structural and cultural vulnerabilities to the unlawful use of inside information by traders and securities organizations. This study suggested that patterns of abuse mirror the changing markets for financial information. Insider trading behavior was part of a dynamic market environment in which innovative ways of raising capital are required for success and survival. Regulations are continually adapted to insure a level of stability in the face of the constant push for innovation. Together the push to innovate and the requirement for regulation expand the demand for new sources of information. As information needs expand or change so do the avenues for abuse. The outlets for exchanging inside information unlawfully increased as the capacity to move and hide information and money became easier. Allen and Ramanan (1995) examined the relation between reportable insider trading and the information captured by annual unexpected earnings for a large sample of firms, spanning a ten-year from 1978 to 1987. Each observation was assigned to one of four groups based on the
direction of net insider trading (Buy, Sell) and the sign (−, +) of unexpected earnings. For each of these groups, 15-months cumulative abnormal returns are regressed on annual unexpected earnings. The slope coefficient is the largest for the group where insiders are net purchasers and the sign of unexpected earnings is positive. This was consistent with an inference that insider buying interactively confirms the favorable information captured by positive unexpected earnings and this interaction reduces the noise in unexpected earnings. The result with regard to the unfavorable information captured by the group with insider selling and negative unexpected earnings was similar but less pronounced. The analysis also suggests that insider trading conveys information not fully captured by that year's earnings. Kabir and Veanaelen (1996) examined the effect of introducing insider trading restrictions on the behaviour of the Amsterdam Stock Exchange (ASE). This study tests whether the introduction of this regulation had any material impact on tile behaviour of stock prices and liquidity on the ASE. From 1987 on, insiders are no longer allowed to trade two months before an annual earnings announcement. All 136 Dutch stocks that were continuously listed on the ASE from January 1984 until June 1989 were considered. The daily stock prices were obtained from Datastream Inc. Announcement data for the years 1984 through 1989 were collected from the press releases of the Algemeen Nederlands Persbureau. Market model was used to calculate the abnormal returns of the sample securities. The results indicated that stocks became less liquid (when liquidity is measured by trading volume) when insiders were not allowed to trade. They also found some evidence that the introduction of insider trading restrictions reduced the stock market's speed of adjustment to positive earnings news. Datta and Datta (1996) documented that there is significant information content in stock
trading by registered corporate insiders for the bond market. The sample contains 196 announcements, 94 of which are insider buy transactions and 102 are sell transactions. The mean-adjusted-returns methodology developed by Masulis in the year 1980 was used to estimate excess bond returns. They reported significant positive price reactions for convertible and straight bonds in response to the Wall Street Journal's Insider Trading Spotlight publication of insider buy transactions and significant negative reactions for insider sell transactions. The empirical evidence suggested that the absence of any reporting requirement for insider bond transactions may create an enhanced opportunity for the insiders to exploit private information to expropriate wealth from uninformed bond traders. Yermack (1997) analyzed the timing of CEO stock option awards, as a method of investigating corporate managers' influence over the terms of their own compensation. He used event-study methodology developed by Dodd and Warner in the year 1983. In a sample of 620 stock option awards to CEOs of Fortune 500 companies between 1992 and 1994, he found that the timing of awards coincides with favorable movements in company stock prices. Patterns of companies' quarterly earnings announcements are consistent with an interpretation that CEOs receive stock option awards shortly before favorable corporate news. He evaluated and rejected several alternative explanations of the results, including insider trading and the manipulation of news announcement dates.

Schrand and Walther (2000) investigated whether managers strategically choose a benchmark earnings number to present in the earnings announcement to evaluate current earnings. Specifically, they analyzed the firm's decision to mention separately a non-recurring prior-period earnings component in a current-period earnings release. The total sample includes 130 observations representing
123 firms. The multiple regression models were employed in the study and the results show that there is strong evidence of strategic reporting by managers, and some evidence that investors are misled by the reports. However, variables those proxies for the benefits of misleading equity investors do not explain the cross-sectional variation in managers' propensities to report strategically. Fried (2000) examined an important mechanism for repurchasing shares: repurchase tender offers (RTO) by corporations to buy back their own stock, usually at a premium over the market price. The study showed that an RTO has the same distributional consequences as a sale of stock by the tendering shareholders to the remaining shareholders at the repurchase price. Thus if the repurchase price is above the actual value of the stock, the RTO transfers value from the remaining shareholders to the tendering shareholders. If, on the other hand, the repurchase price is below the actual value of the stock, the RTO transfers value from the tendering shareholders to the remaining shareholders. Thus by setting the repurchase price above the actual value of the stock, and tendering, insiders can sell their stock at a high price to the remaining shareholders. And by setting the repurchase price below the actual value of the stock, and not tendering, insiders can buy stock at a low price from tendering public shareholders. Insiders can also use an RTO to boost the market price of the stock before selling their stock in the market. Ayres and Bankman (2001) focused on circumstances where an informed insider could trade profitably in its own stock but for Securities and Exchange Commission Rule 10b-5's3 traditional prohibition on insider trading. The analysis suggests that trading in stock substitutes is apt to be less efficient than traditional insider trading. Costs and benefits of traditional insider trading are apt to be internalized to the firm permitting or undertaking such trading; costs and benefits of trading in stock
substitutes are externalized. There is no reason to think that an efficient amount of trading will occur, and under plausible assumptions, there will be too much trading in stock substitute. Hillier and Marshall (2002) tested whether trading ban in periods when corporate insiders are expected to be advantaged the information flow are effective in curtailing insider activity through a study of the trading characteristics of UK company directors. The data set spans the period 1 January 1992 to 31 December 1996. The sample consisted of 7392 transactions of which 3871 transactions were purchases and 3521 transactions were sales. To measure the performance of director trade around earnings announcements, they used a standard event study methodology incorporating the simple market model. They found that although the close period affects the timing of director trades, it is unable to affect their performance or distribution. Directors consistently earn abnormal returns irrespective of the period in which they trade. They tend to buy after abnormally bad earnings news and sell after abnormally good earnings news. Moreover, there are systematic differences in the trading patterns of directors surrounding interim and final earnings announcements. It appears that many corporate insiders have private information and exploit this in their trading activities. As a result, it was conclude that trading bans do not impose significant opportunity costs on the trading of corporate insiders. Brio et al. (2002) investigated the profitability and information content of insider trading in the Spanish stock market. The period of study was from January 1992 to December 1996, and the firms selected were all nonfinancial firms listed on the Madrid Stock Exchange (MSE) and the Spanish continuous market (CM). In total, 995 insider trades from 88 firms were analyzed, 589 of them buy transactions and 406 sale transactions. The breakdown by type of insider was 449 transactions carried out by
corporate insiders and 548 by large shareholders. They were undertaken by 395 different insiders on 452 days, with an average of 2.21 operations per day per person. The event study methodology was applied. The results show that insiders earn excess profits when investing on corporate nonpublic information, while outsiders mimicking them fail to obtain those excess returns. Beneish and Vargus (2002) investigated whether insider trading is informative about earnings quality and the valuation implications of accruals. The evidence is based on a sample of 21,678 firm-years from 3,906 firms with December fiscal year-ends over the period 1985-1996. They used market pricing tests and hedge portfolio tests to examine whether the extent of accrual mispricing differs between firms with high vs. low earnings quality. They also examined the extent to which low earnings quality results from earnings management. The evidences suggest that insider trading is an informative signal about earnings quality and the valuation implications of accruals. The results suggest that researchers focus on the income-increasing component of those accruals. Further it suggests that opportunistic earnings management partially accounts for investors' failure to understand the low persistence of income-increasing accruals that are accompanied by abnormal insider selling. Ke et al. (2003) examined specific nature of the private information that insiders possess and the use insiders make of that information. The final sample contains 80,215 firm-quarters for 4,179 unique firms in the calendar years 1989 to 1997. This sample provides a large number of long strings for a broad set of firms. The multiple regression models are used in the study. This study found that insiders possess, and trade upon, knowledge of specific and economically significant forthcoming accounting disclosures as long as 2 years prior to the disclosure. Stock sales by insiders increase three to nine quarters prior to a break in
a string of consecutive increases in quarterly earnings. Insider stock sales are greater for growth firms, before a longer period of declining earnings, and when the earnings decline at the break is greater. Park and Park (2004) examined the relationship between managers’ insider transactions and their strategic behavior on earnings management. They collected the information on insider transactions made over the entire interval from the 1st quarter of 1998 through the 1st quarter of 2000. The final sample consists of a total of 1471 observations (555 observations with insider transactions and 916 observations without transaction) from six information technology industries. The multiple regression models are employed in the study. The empirical results supported that current discretionary accruals are higher for firms whose managers sell their ownership in the subsequent period than for other firms, indicating that managers of insider sales firms would have deliberately increased current-period earnings through discretionary accruals. They also found that, after accruals manipulation and insider sales, stock prices tend to be adjusted downward in the future and that current high discretionary accruals induced by the insider sales have an incremental explanatory power in explaining the post-transaction stock under performance. Sadka (2006) investigated the components of liquidity risk that are important for understanding asset-pricing anomalies. In all, 4,082 different firms are used for the estimation of liquidity. The total number of trades used is 645 million, 26 million trades of which are above ten thousand shares. The average number of trades per firm, per month is about 1700, while large firms with very high trading volume often reach over one thousand trades per day. Firm-level liquidity was decomposed into variable and fixed price effects and estimated using intraday data for the period 1983–2001. Unexpected systematic (market-wide) variations of the variable component rather than the
fixed component of liquidity are shown to be priced within the context of momentum and post-earnings-announcement drift (PEAD) portfolio returns. As the variable component is typically associated with private information, the results suggest that a substantial part of momentum and PEAD returns can be viewed as compensation for the unexpected variations in the aggregate ratio of informed traders to noise traders. Li and McNally (2007) examined the role of firm characteristics and insider private information in affecting Canadian firms’ repurchase decision and the associated announcement period stock return. This study employed the conditional event study methodology, which is free of self-selection bias. The conditional model also provides a direct test of whether private information is conveyed through the announcement. It was found that firms are more likely to buy back shares if they have greater free cash flows, lower market-to-book ratios, poor prior stock performance, and their insiders have large shareholdings. It was shown that the announcement period returns are strongly and positively related to the private information possessed by company insiders. The market reacts to the reason given for the repurchase and reacts less positively to repeat repurchases.

Cho (2007) estimated and test a multi-period model of strategic informed trading developed by Foster and Viswanathan. The sample moments of price volatility and trading volume are constructed from the prices and trading volumes leading up to quarterly earnings announcements made by NYSE firms during the months of July and October of 1998, and January and April of 1999. The final number of announcements employed in this paper was 2491 for the intra-day analysis, and 2518 for the daily analysis. He employed the Generalized Method of Moments (GMM) using intertemporal patterns of price, trading volume and market
depth, leading up to the earnings announcements made by NYSE firms. He found that multiple informed traders with heterogeneous private signals trade prior to the announcements. In addition, by comparing the results from daily and intra-day estimations, they found that the numbers of informed trader’s increase while the intensity of liquidity trading decreases, and that the adverse selection problem becomes more pronounced as the announcements approach. Durnev and Nain (2007) used a sample of 2189 firms from 21 countries and multiple regression analysis; they found that, on average, stricter insider trading regulations reduce private information trading. However, for firms with high agency costs, insider trading restrictions are less effective in deterring private information trading. They suggested that controlling shareholders who are banned from trading may resort to covert expropriation of firm resources thereby reducing transparency and increasing the returns to private information trading. Consistent with this, they found that firms with higher agency costs located in countries with stricter insider trading laws have more opaque earnings and are valued lower. Ali et al. (2008) used total institutional ownership to proxy for the proportion of better-informed traders, an important determinant of trading around earnings announcements. They argued that institutions holding small stakes cannot justify the fixed cost of developing private pre disclosure information. To test the trading volume model, they identified 22,037 annual earnings announcements from COMPUSTAT for the period 1992–2001. They obtained the required data from CRSP for 13,424 firm-year observations. The results suggested that the relation between trading volume and total institutional ownership is driven by the proportion of shares held by institutions with medium stakes, and that ownership by institutions with medium stakes provides a more refined proxy. Kolasinski and Li (2010) studied insiders’
ability to use public information to earn abnormal returns. They considered 346,120 insider transactions of 6925 firms. They used cross-sectional Fama–MacBeth type regressions for the analysis. They found that insiders trade as if they exploit market under reaction to earnings news, buying (selling) after good (bad) earnings announcements when the price reaction to the announcement is low (high). They also found that insider trades attributable to public information about earnings and the price reaction generate abnormal returns. By demonstrating that manager’s spot market under reaction to earnings news, the results imply that managers are savvy about their company’s stock price. Jiang and Zaman (2010) examined the ability of aggregate insider trading to predict market-wide movement using return decomposition in a vector autoregressive (VAR) model framework. They decomposed realized market returns into expected return, unexpected cash-flow news and unexpected discount rate news to test the relation between aggregate market returns and aggregate insider trading. They found that the predictive ability of aggregate insider trading is much stronger. The aggregate insider trading is strongly related to unexpected cash-flow news. These results strongly suggest that the predictive ability of aggregate insider trading was because of insider’s ability to predict future cash-flow news rather than from adopting a contrarian investment strategy. Inci et al. (2010) documented the intraday reactions of market professionals to the presence of corporate insiders. The sample includes only the open market purchases and sales by corporate officers, directors, and large shareholders on the NYSE, the American Stock Exchange (AMEX), and the NASDAQ stocks for a 15-year period from January 1, 1988 to December 31, 2002. After running through the seven filters, the intraday sample had 177,745 insider trades from 1988 to 2002, with 65,845 insider purchases and 111,900
insider sales, respectively. The annual number of insider trades in the intraday sample ranges from 6,732 in 1991 to 19,194 in 2001. Vector autoregression (VAR) model was applied in this study. To examine the impact of order imbalance on abnormal returns around insider transactions multivariate linear regressions was used. They found that insider trading contributes to the informational efficiency of the stock market. Upon arrival, insiders' purchases are associated with significant initial and subsequent price impacts on a trade-by-trade basis. They found no price impact immediately prior to insiders' trades. There was no price increase prior to insiders' purchase orders, and there was no price decrease prior to insiders' sale orders. This evidence was consistent with the hypothesis that market professionals do not front run insiders' order. Cheng et al. (2011) used a sample of good and bad news concerning earnings and dividend announcements from Hong Kong firms; they showed that information asymmetry is stronger for bad news firms with insider sales than good news firms with insider purchases. In addition, they improved the methodology of Khang and King which was developed in 2006. Evidence from returns to insider trades provide evidence that dividend was a credible signal for measuring information asymmetry. The sample period was from 1993 to 2003 with a total 653 simultaneous earnings and dividend announcements and 3329 insider trading events. They employed event study methodology to evaluate the abnormal share price reaction of insider trades. Landsman et al. (2012) examined whether the information content of earnings announcements increased in countries that mandated adoption of IFRS compared to countries that retained domestic accounting standards. They addressed this research question using a sample of 20,517 earnings announcements from 16 countries that mandated adoption of IFRS and 11 countries that retained domestic accounting standards.
They measured information content of earning announcements based on abnormal trading volume and return volatility around firms’ earnings announcements. Findings from the univariate comparisons indicated that firms from IFRS adopting countries experienced a greater increase in abnormal return volatility and abnormal trading volume than firms from non-IFRS adopting countries. Findings from the multivariate tests generally confirm those from the univariate tests. In particular, findings from country-level and firm-level estimations indicated that firms in IFRS adopting countries experienced a greater increase in abnormal return volatility and abnormal trading volume than firms from non-IFRS adopting countries. Wielhouwer (2013) investigated when public enforcement of insider trading regulations reduces the amount of insider trading. He modeled a game between a potentially self-interested regulator enforcing insider trading laws and a trader who may be trading on inside information. He showed that equilibrium strategies exist where despite active enforcement all inside information was used. Furthermore, he found that increased disclosure in order to reduce the amount of inside information does not necessarily lead to less insider trading as insiders may more frequently use their information. Increased disclosure decreases the contribution of public enforcement to reduce insider trading. He also explained the improvements in the risk analysis system used by the regulator for monitoring purposes may prompt more insiders trading. Tang et al. (2013) investigated the endogenous relationship between abnormal insider trading and accrual abuse, and explores whether corporate governance affects this relationship. The sample included firms listed in the Taiwan Stock Exchange (TSE) and the Over-the-Counter (OTC) Securities Exchange from 1997 through 2010. Data on abnormal accruals, corporate governance, and control variables were collected from the Taiwan Economics
Journal (TEJ) database. The final samples consisted of 8898 firm-year observations from 1303 firms. The results from regression models suggest that insiders take advantage of private information on abnormal accruals to time their trading and manipulate accruals opportunistically to mislead the stock market prior to their planned trading. They found that the abuse of inside information for stock trading becomes more serious when a firm’s ultimate controller has a great divergence of control rights (or seat-control rights) from cash flow rights. They also find that higher family ownership and control, increased managerial ownership, or a dual leadership structure not only induces more private information trading prior to financial reports disclosure, but also intensifies accrual abuse for future trading. The evidence suggests that a poor corporate governance system interacts with abnormal insider trading and abnormal accruals, thereby aggravating insider expropriation on outside investors. Sankaraguruswamy et al. (2013) examined the relationship between the frequency of news release and the information asymmetry. The sample comprises 1031 firms with stocks traded on NYSE during the calendar year 2004. To study the relation between firm specific news release and information asymmetry a single equation OLS model was used. They used a simultaneous equation system that models both the information asymmetry and the frequency of news release. They found that firms with more frequent news releases are associated with lower information asymmetry. They used three measures of information asymmetry: probability of information-based trading, the permanent price impact and the adverse selection component of bid-ask spread. They found that intensity of uninformed trading increases much more than that of informed trading for firms with more frequent news releases. As a result, information asymmetry, as is measured by probability of information-based trading, decreases
for such firms due to the large increase in the intensity of uninformed trading. The findings highlight not only the importance of news releases in leveling the playing field of investors but also the role of uninformed investors in reducing trading cost due to information asymmetry.

Hahn and Song (2013) investigated whether analysts become more reliant on firm earnings announcements in revising their forecasts after implementation of the regulation. They used analysts’ annual earnings forecasts for nine fiscal years (1996–2004). They used multivariate regression models for the analysis. The empirical results show that, after the regulation, more analysts issue forecasts immediately after earnings announcements. In addition, analysts’ earnings forecasts tend to converge more after observing earnings announcements in the post regulation period. These results, in conjunction with the finding of higher overall level of forecast errors and dispersion, indicate that earnings announcements become more important information sources in the post regulation period. These findings suggest that analysts are more reliant on earnings announcements and there is an increase in analyst herding as a result of regulation fair disclosure. Gaynor and Morton (2013) hypothesized that reduced trading activity by noise-traders results in less of an earnings announcement premium during the summer. The study focused on the effect that the summer slowdown has on the reaction to an earnings announcement. They used a sample period of 1990–2009 so as to include data from both the pre-online and online periods. A final sample of 156,122 firm-quarter observations (26,413 in the pre-online period and 128,709 in the online period) were included in the study. Consistent with the hypothesis, they found lower abnormal returns surrounding summer earnings announcements compared to non-summer announcements. They also found lower
abnormal returns in the ten days prior to the announcement, consistent with less
front-running by sophisticated investors. Finally, they showed that these summer
effects are stronger in recent years characterized by more online trading and
greater noise trader participation. Aier (2013) investigated whether insiders in loss
firms trade their company stock differentially around new loss and loss reversal
earnings announcements. The final sample size for the new loss (NL) and loss
reversal (LR) tests were 206,191 and 227,294 quarterly firm observations
respectively. This study used a long event window methodology to capture insider
trading strategies. He found that the likelihood of litigation influences managers’
stock trading decisions prior to material events. He hypothesized and found that
insiders reduce their net stock sales in a monotonic manner before a new loss
announcement presumably to avoid improper trading allegations before bad news.
The results suggest that insiders in loss firms perceive asymmetric litigation risks
to trading stock in the quarters before bad news relative to good news and act
accordingly. Geyt et al. (2014) investigated whether high-quality corporate
communication contributes to reducing insider trading profitability and
information asymmetry. They estimated the regression using ordinary least squares
and clustered, heteroskedasticity robust standard errors. To measure the abnormal
gains of insider trading, they applied event study methodology and calculated
abnormal returns of insider trades over a certain period starting from the
transaction date of each insider trade. The sample included 4889 transactions
reported by insiders of 138 different companies from January 2006 through August
2010. Using disclosure scores of professional financial analysts as a proxy for
communication quality, they found a significant negative association between
corporate communication quality and insider trading profit-ability. Closer
inspection of different communication channels shows that the quality of annual reports, press releases and investor relation activities is more relevant in explaining insiders’ abnormal returns than the quality of corporate websites.

3.4 Conclusion

Market efficiency is one of the cornerstones of modern financial economics. This theory started with the largely unknown work of Louis Bachelier (a French mathematician). After words, Samuleson proposed it again in his dissertation in 1964. Until its adoption, it has raised several controversies. In 1965 Eugene Fama published his dissertation arguing for the RWH. In Fama (1970) survey documented several studies that could not reject the significant power of this theory. Jensen (1978) also believed that "There is no other theory with as much economical background as the EMH". Some studies describes the market as an intelligent agent with an invisible hand that is able to correct the speculative movements in price processes as described in Poterba and Summers (1988). The theoretical and empirical studies of the efficient market have made an important contribution to the understanding of the stock market. A number of scientific researches focused on the stock market have not only developed new theories on capital markets but refined existing ones which are considered sophisticated and efficient in the interpretation of relevant information. The stock market efficiency has been widely tested and has found mixed evidences. In this review, some of the evidences are consistent with the weak and semi-strong forms of market efficiency. The various studies on EMH analysed the various issues by using various methodologies like, GARCH, Runs test, Bicorrelation test, Unit root test, Panel regression, Multivariate co-integration test, Multi-fractal detrended fluctuation analysis, Augmented Dickey-Fuller test, Correlation, Multiple Variance Test,
Rolling Window Method, Autocorrelation Function, event study methodology, simple and multiple regression and some studies developed their own models to investigate information efficiency. The efficiency of stock market is one of the most controversial and well-studied propositions in the literature of capital market. Even if there have been a number of researches and journal articles, economists have not yet reached a consensus about whether capital markets are efficient or inefficient especially emerging markets like India. The wide range of studies concerning the market efficiency in the literature provides mixed evidences. This disagreement regarding the market efficiency has generated research interest in this topic in Indian stock market.